CENTRAL INTELLIGENCE AGENCY

INFORMATION REPORT

SECRET

SECURITY INFORMATION

25X1

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(FOR KEY SEE REVERSE)

25X1

Production of Caprolactam

1. Caprolactam was produced by a chemical plant at Zilina /4913N-1844E/, Slovakia. The basic raw material for its production was phenol (C_6H_5OH), which was reduced to cyclohexanol, this being converted into cyclohexanone by oxidation. Cyclohexanone was converted into the oxime by treatment with hydroxylamine. The oxime was subsequently made to undergo the Bechmann transformation by treatment with sulphuric acid, which converted it into caprolactam ($CH_2-CH_2-CH_2-CH_2-CH_2-CONH$).

2. This caprolactam was shipped from Zilina to the Silon Plant in Plana nad Luznici /4921N-1442E/ either in crystalline form (usually called "lactam salt" although this name is chemically incorrect) which was transported in aluminum containers, or as a 70% solution in distilled water, shipped in rustproof, mostly aluminum coated tank cars. Crystalline caprolactam was also supplied by the USSR packed in rubber bags.

Production of Σ-caprolactam Polyamide Yarn, Called Silon
/References are to Enclosure C, Points #1-50./

3. Liquid caprolactam was stored in a large underground tank with a capacity of 100 cubic meters /Point #2/ into which it flowed from the railroad tank by gravity; the space within which this tank was placed was heated by warm air during winter. The liquid in the tank was circulated continually by a centrifugal pump in order to avoid crystallization.

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4. Caprolactam in solid form ("lactam salt") was stored in the basement of the plant in a rather cool and dark storage room to prevent loss in quality.

5. Liquid caprolactam, prior to being processed, must be checked for the exact composition of the solution (70%). In case of error the solution was conducted into a dissolving vessel /Point #6/ and heated to a temperature of 80°C (176°F). If the concentration was found to be too high, distilled water /measured at Point #11/ was added and the whole was thoroughly mixed. If the concentration was too low, some caprolactam was weighed on scales /Point #4/ and conveyed to the dissolving vessel /Point #6/ by a conveyor /Point #5/. In addition, some activating and stabilizing agent was added to render polymerization easier and control molecular weight and viscosity of the polymer (one of these agents was Σ-aminocaprylic acid -- $NH_2(CH_2)_5COOH$ -- added at a ratio of one per cent). The liquid was subsequently mixed by means of a blade propeller and once more checked for proper concentration. Afterwards it was led into a homogenizer /Point #1/ employing a blade propeller. From here a centrifugal pump /Point #8/ fed the liquid caprolactam to an elevated tank /Point #9/ as often as needed, automatic operation of the system being arranged by means of a float. From here, the caprolactam flowed on by gravity until reaching the evaporation tubes of the polymerization chambers. On the way it was subjected to three thorough filtrations. First it passed through two filters /shown at Point #12/ arranged in such a manner that one of them could remain in operation when the other had to be cleaned. Next to these filters there were two more homogenizers /Point #13/. A caprolactam distributing pipeline was located below, extending from one end of the building to the other, to feed separate polymerization "units". Each "unit" comprised four polymerization stations, each of which consisted of eight chambers. From the distributing line, caprolactam was supplied to a measuring and storing tank /Point #14/ within which constant level and constant static pressure were maintained by means of a float system. A second filter /Point #15/ was installed below; from there on the pipeline divided into four branch lines, each of them leading to a set of polymerization chambers. Before the liquid was fed to the chambers, it underwent a third, finest filtration /at Point #16/ and was given a constant static pressure of about 35 mm. water column by means of a float control.

6. The liquid caprolactam was then fed to the polymerization chambers /Point #1/. First the water was evaporated in evaporating devices, one of which was fixed on top of each chamber. The vapors were led to a condenser /Point #20/ which was cooled by raw industrial water. The distillate, which contained about one per cent of monomer, was led to an accumulation tank /Point #10/. Polymerization chambers utilized low-frequency induction heating to 267°C (514.4°F) at which temperature polymerization of caprolactam took place gradually. Polymerization was essentially an infinitely proceeding intermolecular union: caprolactam molecules were opened up by the water present to unite into larger molecules, thus gradually forming dimer, trimer, tetramer, etc., until long chains of high polyamides were obtained. The chemical formula of caprolactam polymer was $H\text{-}/NH\text{-}(CH_2)_5CO/_n\text{-}OH$. The entire process usually took about 12 hours' time. The hot polymer was pressed through a filter by means of gear pumps and extruded through nozzles /Point #18/ into conditioned air of normal pressure, whereupon solidification occurred.

7. At the following stage the fiber thus obtained was subjected to a very important procedure, the so-called "cold drawing" or "stretching", whereby the molecules of the polymer were aligned and interlinked, thus securing high tensile strength in the yarn. Silon had a tensile strength of approximately five to six grams/denier, this load causing

an extension of 20 to 25%. A spinning-and-stretching machine picked up the extruded yarn from the nozzle at a speed of 250 m. per minute and applied a special emulsion on it. ([redacted] 25X1 it was employed to reduce the electro- 25X1 static charge on the fiber.) The yarn was stretched between an upright and an inclined roll /Point #25/ and a duralumin spinning spool /Point #26/, which operated at a speed of 1,000 to 1,250 m. per minute. The molten caprolactam extruded through the nozzle contained up to seven per cent monomer which had to be removed from the spun yarn by elution with warm water. This was achieved by means of a pressure washing machine /Point #14/, which reduced the monomer content to about one per cent. After washing, the spooled yarn was usually allowed to dry out to some extent overnight before being processed further.

8. A special washing-water system was set up to serve the washing machines. It consisted of an underground used-water tank /Point #34/ from which the used water, which still had a temperature of about 50°C (122°F), was pumped by means of a centrifugal pump /Point #37/ to the elevated water-heater /Point #33/, where its temperature was raised to 80°C (176°F) by means of a steam heating coil. The washing water circulated steadily. As the monomer content in the water must not be allowed to exceed five per cent, a certain quantity of water was continually drained off by a valve /Point #35/ and led into a concrete used-water vessel /Point #36/. It was replaced by an equal quantity of fresh warm water supplied from the water heater /Point #32/.

9. It was intended to install an evaporating column /in area shown at Point #49/ to extract the caprolactam diluted in the washing water. The Skoda Works at Hradec Kralove /5013N-1550E/ have been given a preliminary order to develop such an evaporation unit. This order has been assigned to Ing. (fnu) BALAJKA. It was intended that the first unit be small and operate on a trial basis. If it should prove to work economically, a larger unit will probably be installed later.

10. The advantages of the centrifugal washing and extracting machines were that they could easily be operated by female labor and that so much of the water could be removed from the yarn that the eluted yarn, wound onto spinning spools, could undergo further processing on twisting machines without delay. As a matter of fact, the remaining water could be dried out during twisting to approximately 4.5%, a figure which represents the usual percentage permitted.

11. The twisting department of the Silon Plant used two kinds of twisting machines.

    a. The first kind were conventional twisters /Point #38/ which took up the yarn from spinning spools, twisted and emulsified it, wound it onto short twisting spools, and finally coned it on "coners" to so-called "pineapple packages", which are standard in the textile industry. Standard conical paper bobbins, 3°30' x 176 mm.-6" traverse, had been used for these packages, but had to be replaced by special reinforced bobbins of five millimeter thickness to match the heavy pressure of silon yarn. The heavy pressure of silon yarn was due to its strong tendency to contract.

    b. In the Spring of 1952 new-type twisters (up-twister coners) were installed. These machines had been developed at the engineering department of the Silon Plant and built by a plant (the former Zima firm) at Opocno /5016N-1607E/. These machines /Point #40/ twisted the yarn, applied the emulsion to it, and wound it onto pineapple cones so that any separate coning was eliminated. A total of 65 machines was ordered from the factory at Opocno. The special emulsion which was applied to the yarn was stored in a

tank /Point #447 which supplied it to spinning machines, twisters, and coners. The yarn, twisted on these up-twister coners, was originally coned on standard reinforced paper bobbins 3°30' x 170 mm. - 6" traverse, with a cone basis of 45 mm. in diameter. Bobbins of a larger diameter -- 80 mm. -- were later developed by the paper goods factory in Tabor /4925N-1440E/. A certain number of wooden spools of the same size as the original bobbins were atill in temporary use in the Summer of 1952.

12. The finished product was checked, sorted, packed in paper and wooden boxes, and stored in the basement of the plant /Point #427.

13. Production at the Silon Plant started only in January 1951, and only the following yarn sizes were being made there as of Summer 1952:

a. 40 den. -- 12 filaments, 100 twists per meter;

b. 60 den. -- 16 filaments, 100 twists per meter.

c. 120 den. -- 24 filaments, 100 twists per meter;

d. 240 den. -- 32 filaments, 100 twists per meter.

The production of 60 den. yarn, at a speed of 1,000 m. per minute, required approximately 0.39 kg. of polymer per hour.

14. The plant possessed a water purifying installation /Point #287 which filtered raw industrial water and removed ferrous and mineral admixtures. The purified water was collected in an underground concrete basin /Point #307, from where it was forced by a centrifugal pump /Point #297 to an elevated tank /Point #317 which supplied it to the water heater /Point #327, to the emulsion-preparation tank /Point #447, and to laboratories.

15. In addition, a tank filled with raw industrial water /Point #217 was located in the superstructure (fourth floor) of the factory building, supplying the necessary cooling water to condensors /Point #207, from where it was led back to an underground tank /Point #227. The water accumulated here could be used again, being forced into an ascending pipe line by a centrifugal pump /Point #237.

16. A steam line of two atmospheres pressure (guage) was fitted to a tank /Point #67 and to the water heaters /Points #32 and 337. The condensed steam from the tank /Point #67 and from all air-conditioned units and heating radiators was collected in a tank /Point #467 and reconducted to the boiler house.

17. The water vapors that were condensed in the condensor /Point #207 and collected in a tank /Point #107 were occasionally used for diluting caprolactam "salt". The tank /Point #107 was provided with an overflow from which a pipeline extension /Point #507 led to a collecting tank /Point #477 and a centrifugal pump /Point #487. This condensed water contained about one per cent caprolactam monomer or dimer, which was worth recovery and utilization. A glass pipeline led from the pump to a railroad spur where railroad tank cars were unloaded. After the caprolactam was unloaded, the condensed water was put in the tank cars, which were then returned to Zilina. There the water was used for diluting new caprolactam to be dispatched to the Silon Plant.

Uninterrupted Polymerization Process in Individual Chambers
/References are to Enclosures C and D, Points #52 to 78./

18. The most important features of the polymerization process were as follows:

a. Automatic caprolactam supply by means of vapor pressure;

b. Low frequency induction heating; this was not resistance heating. The winding was of enamelled copper wire without any external thermal insulation. When in operation, the winding might be touched with the bare hand without danger. The power consumption for one chamber was about 1.6 - 1.8 kw., depending upon the effectiveness of the insulation.

c. A system of inner partitions with the aim to prevent non-polymerized caprolactam from mixing with polymers;

d. A combination of two gear pumps, driven by one shaft, with an automatic weight valve in the by-pass which ensured a constant pressure on the polymer being extruded through the nozzle.

19. The evaporating tube /Point #19/ consisted of a head piece /Point #62/ with a glass dome /Point #64/ on top. A slotted tube /Point #63/ with an orifice at its lower end was screwed into the head piece and a long tube with some kind of cylindrical bell /Point #51/ was flanged in its lower part. Around this long tube a mantle formed an airtight compartment which communicated with the main space of the chamber by means of openings in the flanged portion. The evaporating tube was fastened to the lid by means of its flange, thus tightly closing the insert /Point #52, Encl. D, Item b/. It is evident that the insert /Point #52/, which was fastened to the chamber in its lower part by means of a screw /not shown in the sketch/ had a chance to expand to some extent. This was important, inasmuch as the chamber was made of a cold-drawn steel tube, while the insert was of aluminum, and these materials have quite different coefficients of heat expansion. The evaporation tube worked as follows: Let us suppose the level of caprolactam is below the rim of the bell. In this case the water vapors, differing throughout the whole space, have a chance to enter freely the condensation device /Point #20/ through a neck filled with small hollow aluminum cylinders /Point #59/ (Raschig type rings), which condense caprolactam vapors but not water vapors. The static pressure in the inner part is reduced to some 15 mm. water column. Inasmuch as the static pressure of the caprolactam as mentioned above, is 35 mm. water column, the caprolactam starts flowing into the hot caprolactam level. This causes the water to evaporate rapidly, continuing until the level of caprolactam reaches the rim and closes the bell. Afterwards the existing vapors fill the inner part of the evaporation tube and drive the caprolactam out of the bell /Point #51/, until the level in the insert falls below the rim of the bell. A glass-covered level indicator /Point #58/, connected with a float /Point #56/, was installed on the upper lid of the chamber to facilitate inspection and checking of the automatic mechanism.

20. The polymerization chamber consisted of an iron tube /Point #17/ with upper and lower flanges, and a cross-member /Point #80/ in its lower part. Two brackets /Point #67/ were welded to its outer wall. Thermal insulation /Point #65/ surrounded the chamber, and low frequency wiring /Point #66/ was wound around this outer wall. The circuit thus formed was supplied with ordinary A.C. of 220/380 V and 50 cycles. The induction current thus originating created the necessary heat of 268°C (514.4°F) on the inner steel tube.

As a result of evaporation, the upper level of the caprolactam in the chamber usually had a temperature of only 240°C (464°F). To maintain the required temperature of 268°C, [redacted] "drop-type" regulators, 25X1
a product [redacted], were used; their principle was 25X1
based on a vertically mobile anchor which by dropping interrupted the electric current. The regulator was activated by low currents produced by bimetallic thermoelements arranged in three horizontal layers in the lower part of the heat indicator /Point #57/.

21. To set up a continuous process of polymerization of caprolactam it is extremely important to prevent new incoming liquid caprolactam from mixing with gradually forming polymers. Caprolactam has a strong tendency to penetrate polymerized layers, thus causing the polymer to be heterogeneous. To overcome this difficulty, a system of inner partitions was developed which proved to work well, so that the regular structure of the polymer, and consequently its quality, greatly improved. The new system worked as follows: By inserting a narrow tube /Point #55a/ into a wider tube /Point #55b/ which was closed at its lower end, caprolactam was actually sealed off from the polymer. Two spirals, a left-turning spiral and a right-turning one /Points #53 and 54/ prolonged the process of polymerization, thus minimizing the amount of penetrating caprolactam monomer.

22. In order to prevent the polymer from flowing out of the polymerization chamber, a hand-operated cock /Point #69/ was used. The cock was part of a separate block screwed onto the bottom of the cross-member. To this block a rectangular gear pump /Point #18/ was attached, on the left side of which was a smaller pump of 1.2 cubic centimeters capacity per revolution /Point #78a/ -- and on the right side a larger one of 2.4 cubic centimeters capacity per revolution /Point 78b/. Both pumps were connected by a common drive shaft /Point #79/. In practice the speed of this shaft was 7½ rpm for 40 denier yarn, and 12 rpm for 60 denier yarn. This system of two pumps working in tandem was adopted to obtain an even size of the yarn. Furthermore, an automatic valve /Point #70/ was developed, regulating by weight the pressure of the polymer between the two pumps so that a constant pressure of about 20 atmospheres (guage) could be maintained. The polymer, supplied in exactly calibrated quantity by the pump /Point #18a/, was led through a filter /Point #72/ and subsequently forced through the orifices of a nozzle /Point #73/, the diameter of each orifice being .4 mm., that of the nozzle 59 mm. After passing the nozzle, the extruded filaments entered the air-conditioned space of a tube /Point #74/ where they solidified and slowly descended. To keep the polymer in best condition for spinning, a heating jacket /Point #71/ surrounded the filter /Point #72/. The temperature was kept constant at 285°C (545°F) by means of drop type regulators as described above. Inasmuch as the nozzles must be cleaned rather frequently, the tubes /Point #74 and 75/ were fitted together telescopically. The whole installation was operated from the platform /Point #77/. During the spinning process considerable amounts of monomer vapors formed around the nozzle, which were condensed by action of moist air admitted gently by tube /Point #75/. Condensation took place on the cooler walls of the tube /Point #75/ whereupon the monomer containing condensate collected on the lower rim and flowed to a collecting pot through the pipe /Point #76/.

Spinning and Stretching of Silon

/References are to Enclosures C and E, Points #81 to 108./

23. The filaments descending slowly from the nozzle were collected in a trough /Point #86/ of the spinning-and-stretching machine /Point #24/ located beneath the polymerization chamber. The machine operator picked up the end and wound it around the rotating spool /Point #26/, holding the yarn with his left hand by means of a wire hook near the roll /Point #25/. Subsequently he inserted the yarn into the hook /Point #83/ and into the traversing lever (krizovaci rameno) /Point #81/.

In order to put the stretching mechanism into action, he picked up the yarn -- running at full speed already -- with a "pigtail" (vodici ocko), which he held in his right hand, and wound the yarn around the stretching mechanism [Points #25 to 81] about three to five times. Immediately afterwards a fully stretched yarn began to wind onto the spool [Point #26]. Then a revolver [Point #108] was turned 180° to allow the stretched yarn to be wound onto a new spool while the yarn on the first spool was cut off as waste. The stretching roll [Point #25] and the spool [Point #26] were driven by an endless belt [Point #82] as is usual on twisting machines. The machine just described [See Encl. E, Item a] was in use on a large scale. Some disadvantages of the principle it employs were discovered rather early. If the yarn is wound onto the spinning spool under full drawing tension, much trouble in further processing results through breakage of individual filaments. Further, if the yarn is wound onto the spool without initial twists, the twisting department can find all the broken ends on the spool only with difficulty.

24. Consequently, a new principle [shown on Encl. E, Item b] was applied, and a new type of machine, called a pot spinning machine, was developed and partially tried out. This machine consists of two electric spinning motors [Point #87] mounted on revolving arms; each of these motors carries a centrifugal spinning pot [Point #88] of the type used with viscose spinning machines. The yarn is led in and traversed by means of a tube [Point #89] through which warm water is flowing. The warm water enables the yarn to enter the pot and simultaneously elutes any remaining monomer. The pots revolve at a speed of 10,000 rpm. At a spinning speed of 1,000 m. per minute the yarn may be given 10 initial twists per meter. It is intended to place sets of stretching rolls [Points #90 and 91] and emulsion rolls [Point #92] in the upper part of this spinning unit. The stretching rolls are to be on top and still in reach of the operator. So far, pot spinning of silon yarn as a separate operation has proven to be successful. The next task would be to combine the stretching and spinning mechanisms and to test this combination.

25. It was also intended to try out the principle of cap spinning, and therefore the construction of an experimental cap spinning unit was included in the program of engineering research. Some restricted but quite promising research work on cap spinning was done in 1947, but had to be given up because of lack of personnel. The cap spinning principle [as shown in Encl. E, Item c] has a great advantage: By means of a cap the yarn can be wound onto the spool with very little initial tension, regardless of its traveling speed.

26. The traversing eccentric [Point #98] was mounted vertically in the frame [Point #97] on a stationary rod. On top of this was fixed a double-arm revolving head with two possible stopping positions [Point #99]. A vertically movable traversing rod [Point #103] was inserted into a long sleeve on which was mounted an easily turning bearing sleeve with a driving pulley and centering rings which were to carry the spool [Point #100]. A spinning cap [Point #101] was fixed on a rod [Point #103] above the spool as usual in cap spinning machinery. The rod [Point #103] was set in vertical motion by means of an eccentric [Point #98] and this motion was transferred to the cap [Point #101], the lower rim of which conducted the yarn to the spool. The pigtail [Point #104] had to be exactly centered in this case. A stretching mechanism [Points #105 and 106] with sizing rolls [Point #107] may be mounted on top, depending upon the results of the trial operation.

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Monomer Eluting Machines

27. The eluting machine /shown in principle in Encl. F, Item a/ consisted of a large chamber /Point #41/ made of galvanized sheet steel. Inside, on a horizontal foundation, a water distribution grid /Point #111/ was mounted with vertical tube extensions for each set of spools. The spools /Point #26/ were piled to the full height of the chamber and firmly screwed to the grid. Water is then led in through a pipeline /Point #116/ and heated to approximately 176°F by steam supplied directly from the line /Point #115/. Subsequently the lid of the chamber /Point #112/ was closed and the centrifugal pump /Point #113/ was set in operation. Elution required about four hours per cycle, including the time needed for removing the eluted spools and replacing them with spools to be eluted. The water was discharged after use into a waste disposal system through a large valve /Point #114/.

28. The experimental eluting machine /shown in Encl F, Item b/ employed a centrifugal principle. On a longitudinal frame /Point #27/ a row of heavy-type roller-bearing spindles /Point #118/ were mounted and rotated separately by belt-driven pulleys /Point #120/. Perforated spinning caps /Point #121/ were centered on the spindles and maintained in position by the upper cone-shaped lids /Point #122/ which were provided with water passages. Water was injected by jets /Point #129/ centered in these lids. Each spindle was fitted into a cylindrical mantle /Point #119/ with drainage to a central pipe /Point #123/. Washing-water was led in from the pipeline /Point #124/ through a valve /Point #125/ and a flexible pipe /Point #128/ attached to the jet /Point #129/. When closed, water was fed at a rate of approximately three liters per minute. Machines of this type were tested extensively and found to be correct in principle but difficulties occurred with unbalanced spools.

Twisting Machinery
/References are to Enclosures C, G, and H./

29. Ten ordinary twisters /as shown in Encl. G, Item a/ have been used at the Silon Plant in Plana. These twisters were originally delivered as silk and rayon twisting machines, producing cylindrical headless packages, and had to be modified for silon production by being adjusted for perforated spools /Point #133/ of 90 x 125 mm. and equipped with a so-called "pineapple attachment" /Points #136 to 138/. The truncated cone-shaped ends of pineapple packages were produced by a special mechanism which consisted of a turnable guide /Point #135/ directed by a bar /Point #137/ which acted on a crank /Point #138/. The bar had a short mobility to the left and right sides in relation to the main traverse motion of the bar /Point #136/ in such a manner that the guide /Point #135/ turned through a certain angle /see Encl. G, Item c/ in a clockwise direction while in its left-hand position and counter-clockwise while in its right hand position. The guide being fixed /as shown in Encl. G, Item c/, it was possible by means of this arrangement to form a pineapple package on each individual spool in spite of the fact that there was only one directing mechanism for the whole row.

30. Twisters of the "Parcofil" type /as shown in Encl. G, Item b/ which take the yarn from cylindrical spools and work it up into pineapple packages, were part of the standard equipment of the Silon Plant. The paper bobbins were fastened by a two-armed clamp /Points #144 and 145/, which could be opened by putting it into an upward position. As apparent from the sketch, the yarn, as it is spooled by this type of machine, does not come into contact with anything but the guide /Point #147/. The conical bobbins were driven here by spur gears (celni ozubene kolo) /Points #141 and 142/. A specially designed

eccentric drive ensured that a higher speed was achieved in a left-hand position of the guide and a lower speed in its right-hand position in precise accordance with the actual circumference of the cone, so that a constant speed, and consequently a uniform twist of the yarn, was obtained.

31. The design of a new type of twister machine was being prepared by the engineering research department with the final goal of overcoming the difficulties caused by central doffing. With the new type /Encl. G, Item c/, the conical 3°30' x 170 mm. bobbins will be driven by friction with the aid of conical driving drums /Point #151b/ which will be equipped with a turnable guiding mechanism /Points #153 to 157/ as described in paragraph 29 above/, an elliptic gear drive acts on a shaft /Point #151a/ in such a manner that this shaft is given a higher revolving speed when the mobile traversing bar /Point #153/ common for the whole row of bobbins is in a left-hand position, and a lower speed when it is in a right-hand position. This way the yarn will be given a constant traveling speed and twist throughout the package, and individual doffing will also be possible.

32. Coners were still in use at the Silon Plant in connection with twisters of the type shown in Enclosure H, Item a. It is probable that a certain number of coners will also be used in the future even if the whole production is carried out by twister-coners /Encl. H, Item b/. They will be necessary for an occasional rewinding or if the customer should require a special sizing. Standard [redacted] coners 25X1 with pineapple attachments /as shown in Encl. H, Item a/ are used. This type is quite suitable for the coning of synthetic yarns because it gives the yarn an upright travel without sharp bends so that it can be coned with the least possible tension, and the right permanent shape is achieved with no underwinding.

33. When Dr. (fnu) KARNY, former general manager of the nationalized chemical industry of Czechoslovakia, visited the Silon Plant at the beginning of 1951, he laid down the general directions for building up this new industry and said: "This will be a chemical plant and therefore textile operations will be limited to the smallest possible extent. Consequently yarns of any kind and size will be twisted here only up to a maximum of 100 twists per meter." Following this order a new type of high-speed twister-coner /as shown in Encl. H, Item b/ was developed by the chief of production, Emil NEMEC. This type will be capable of twisting yarn at a speed of 250 m. per minute and imparting 40 twists per meter. A one-spindle coning machine, already built and tried, proved to work perfectly. The design of an 8 to 16 spindle machine by the Engineering Research Department was scheduled for 1952/1953.

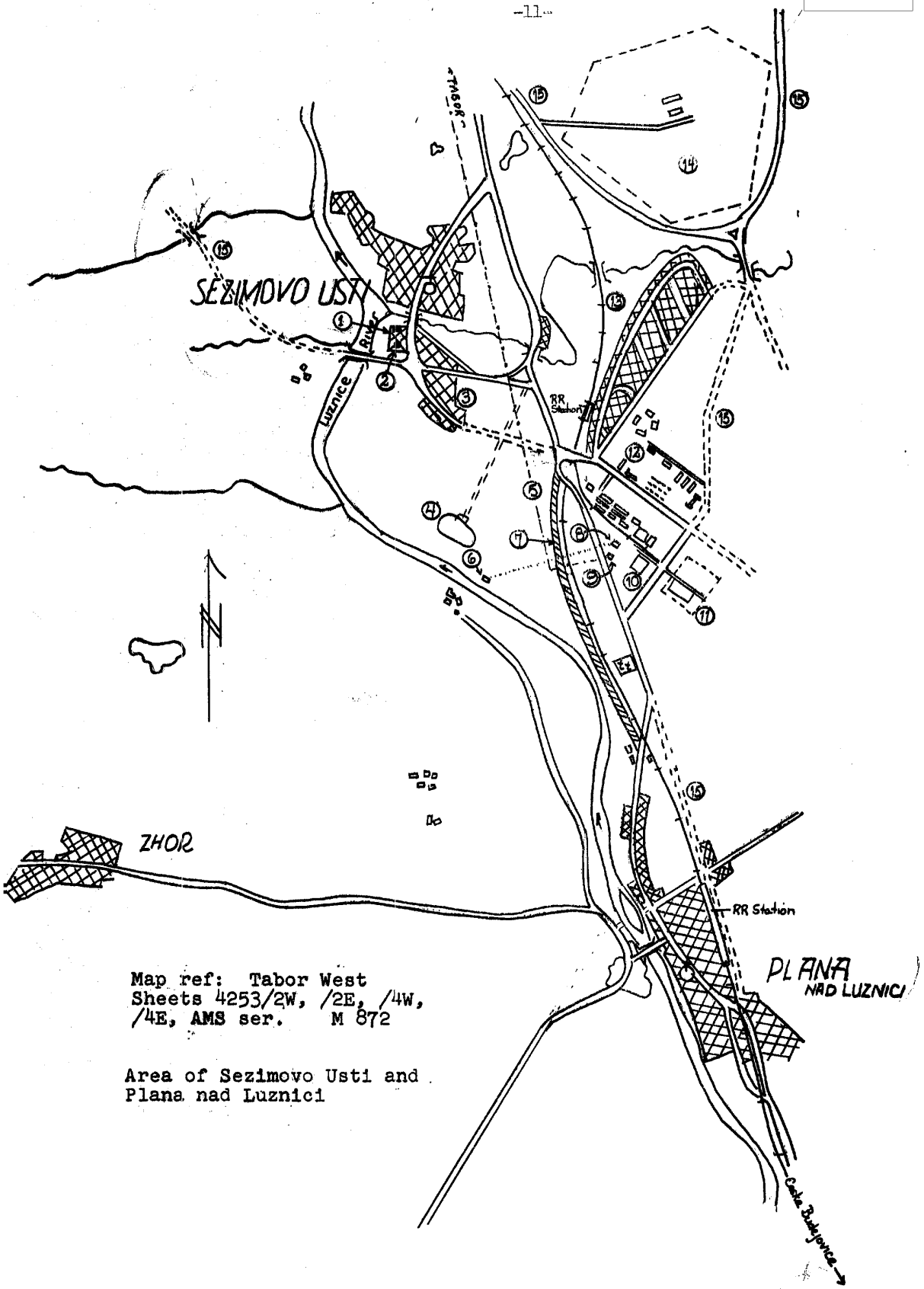
34. The new type /Encl. H, Item b/, is based on the ordinary coner, but its frame /Point #39/ will have to be prolonged to allow more space for the twisting spindles and the sizing roll system /Point #166/. The arrangement of the spindle rail at the base and the drive of the twisting spindles by a system which consists of a driving pulley /Point #172/, a tension sheave /Point #173/, and a spindle pulley /Point #174/ with foot brake /Point #175/, is well solved from an engineering standpoint, because this arrangement minimizes vibration. As is easily apparent on standard coners, the "constant drive" is not yet really constant and further development will be necessary. As a matter of fact, action of elliptic or eccentric driving spur gears on the main spindle shaft /Point #176/, synchronized with the camshaft /Point #164/, will solve in a satisfactory manner the problem of a fully constant traveling speed of yarn in coning machinery.

25X1

Enclosures:

A. Area of Sezimovo Usti and Plana nad Luznici
B. The Kovosvit Plant
C. Flow Chart of Production of Synthetic -Caprolactam Polyamide Silon Yarn
D. Polymerization Chamber
E. Spinning and Stretching Machinery
F. Monomer Eluting Machines
G. Silon Twisters
H. Silon Coner and High-Speed Twister-Coner

Enclosures A and B and legends to Enclosures A through H form pages 11 through 20 of this report. Enclosures C through H accompany the report.



Map ref: Tabor West
Sheets 4253/2W, /2E, /4W,
/4E, AMS ser. M 872

Area of Sezimovo Usti and
Plana nad Luznici

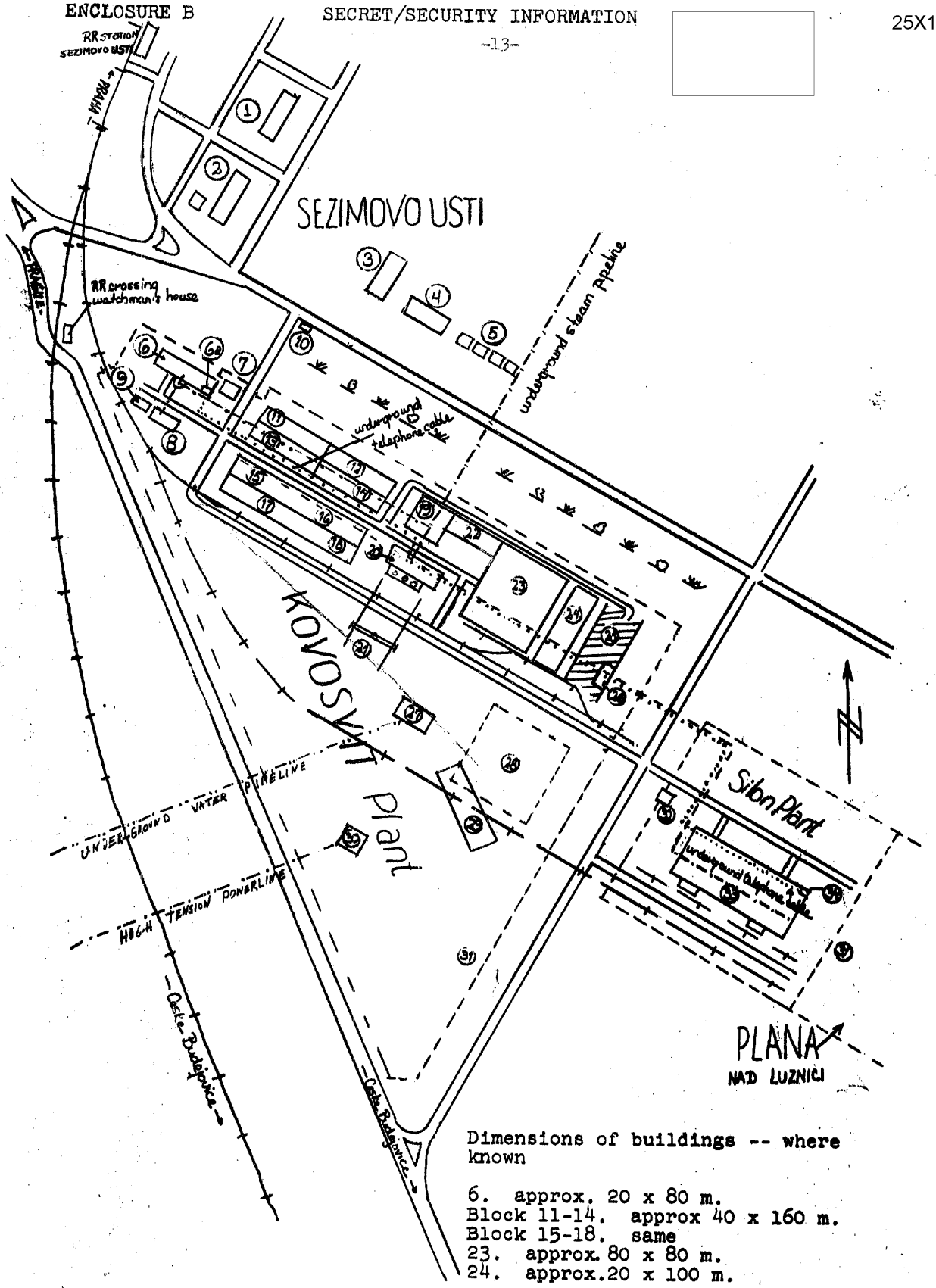
25X1

Legend

1. Late President Benes' estate and SNB station
2. Home of Minister Zdenek Fierlinger
3. Homes for Silon workers
4. Stadion (sporting ground and swimming pool)
5. High tension line
6. Water pumping station
7. Highway transferred to other side of RR
8. Water filtering station
9. Transformer station
10. Kovosvit Plant
11. Silon Plant
12. Kovosvit workers settlement
13. Kovosvit workers' housing development
14. Airfield
15. Projected roads

ENCLOSURE B

25X1



Dimensions of buildings -- where known

6. approx. 20 x 80 m.
Block 11-14. approx 40 x 160 m.
Block 15-18. same
23. approx. 80 x 80 m.
24. approx.20 x 100 m.

(not drawn to scale)

The Kovosvit Plant

25X1

Legend

1. Dormitory for apprentices
2. Kovosvit workers' club
3. Administration building of OSSZ
4. New apartment houses for Kovosvit workers
5. Workers' housing development
6-31. Kovosvit Plant
6. Administration building
6a. Communications center
7. Main entrance and guard house
8. Cafeteria
9. Garages
10. Gas filling station
11-15, 17. Production halls
16, 18. Foundries
19. Steel hardening and tempering department
20. Power Plant
21. Overhead traveling crane
22. Tool plant
23. Newly built hall
24. Storehouse
25. Lumber yard
26. Lumber shed
27. Water filtering station
28. Proposed location of new foundry
29. Temporary plumbing material warehouse
30. Transformer station
31. Wire fence

31-34. Silon Plant
31. Wire fence
32. Factory guard house
33. Silon pilot plant
34. Telephone center

25X1

Legend

1. Liquid caprolactam arriving
2. Caprolactam storage tank
3. Solid caprolactam arriving
4. Scale
5. Conveyor
6. Caprolactam dissolving vessel
7. Homogenizer
8. Centrifugal pump
9. Elevated tank
10. Accumulation tank
11. Measuring apparatus
12. First filtration point
13. Homogenizers
14. Measuring and storing tank
15. Second filtration point
16. Third filtration point with valve
17. Polymerization chambers
18. Gear pump block and nozzle
19. Water evaporation tube
20. Condenser
21. Elevated raw water tank
22. Underground raw water tank
23. Centrifugal pump
24. Spinning-and-stretching machinery
25. Stretching rolls
26. Rotating spinning spool
27. Centrifugal eluting machine
28. Water purifying installation
29. Centrifugal pump
30. Concrete basin
31. Elevated tank
32. Water heater
33. Elevated tank
34. Used-water tank
35. Valve
36. Concrete used-water tank
37. Centrifugal pump
38. Conventional twister
39. Coning machine with pineapple attachment
40. New type of twister
41. Pressure washing machine
42. Sorting and packing department
43. Dispatch
44. Emulsion preparation tank
45. End product (pineapple cones)
46. Collecting tank
47. Collecting tank
48. Centrifugal pump
49. Evaporating column
50. Pipeline extension to collecting tank (Point #47)

25X1

Legend
(Numbers below 51 to be looked up in legend to Enclosure C)

51. Tube with bell
52. Aluminum insert
53. Right-turning spiral
54. Left-turning spiral
55. Separating tubes (a and b)
56. Float
57. Heat indicator
58. Glass cover of level indicator
59. Packing of aluminum cylinders
60. Flow regulating valve
61. Float
62. Head piece
63. Slotted tube
64. Glass dome
65. Thermal insulation
66. Low frequency heating
67. Brackets
68. Fastening lugs
69. Cock
70. Automatic valve
71. Heating collar
72. Filter
73. Nozzle
74. Filament cooling tube
75. Air-conditioning tube
76. Monomer condensing pipe
77. Operation platform
78. Gear pumps (a and b)
79. Gear pump drive
80. Cross member

25X1

Legend
(Numbers between 1 and 50 to be looked up in legend to Enclosure C)

81. Traversing lever
82. Endless driving belt
83. Hook
84. Inclined roll
85. Yarn sizing (emulsifying) device
86. Trough
87. Electric spinning motors
88. Spinning pot
89. Elution tube
90. Stretching rolls
91. Stretching rolls
92. Emulsion (sizing) rolls
93. Monomer collecting tube
94. Conditioning tube
95. Traversing mechanism
96. Frame of pot-spinning machine
97. Frame of cap-spinning machine
98. Traversing eccentric
99. Revolving head
100. Sleeve with driving pulley and centering rings
101. Spinning caps
102. Spinning spools
103. Traversing rod
104. Pigtail
105. Lower stretching rolls
106. Upper stretching rolls
107. Sizing rolls
108. Revolver

Legend
(Numbers from 1 to 50 to be looked up in legend to Enclosure C)

111. Water distribution grate
112. Lid
113. Centrifugal water pump
114. Discharging valve
115. Steam pipe with valve
116. Water pipe line with valve
117. Hook of traveling crane (DEMAG type)
118. Roll-bearing spindles
119. Mantle
120. Driving pulleys
121. Centered perforated cap
122. Lid
123. Drainage
124. Eluting water tube
125. Valve
126. Valve opener
127. Lid-and-valve opening lever
128. Flexible pipe
129. Jet

25X1

Legend
(Numbers from 1 to 50 to be looked up in legend to Enclosure C)

132. Driving drum
133. Perforated spools
134. Spool holder
135. Traversing guide
136. Traversing bar
137. Inclining bar
138. Inclining crank
139. Sizing device
140. Pigtail
141. Driving spur gear
142. Driven gear
143. Bearing
144. Two-armed clamp
145. Two-armed clamp
146. Traversing rod
147. Yarn guide
148. Roll-bearing spindle
149.
150.
151a Shaft
151b Conical driving drums
152. Holder
153. Traversing bar
154. Inclined bearing
155. Thread guide with crank
156. Eyelet
157. Auxiliary bar

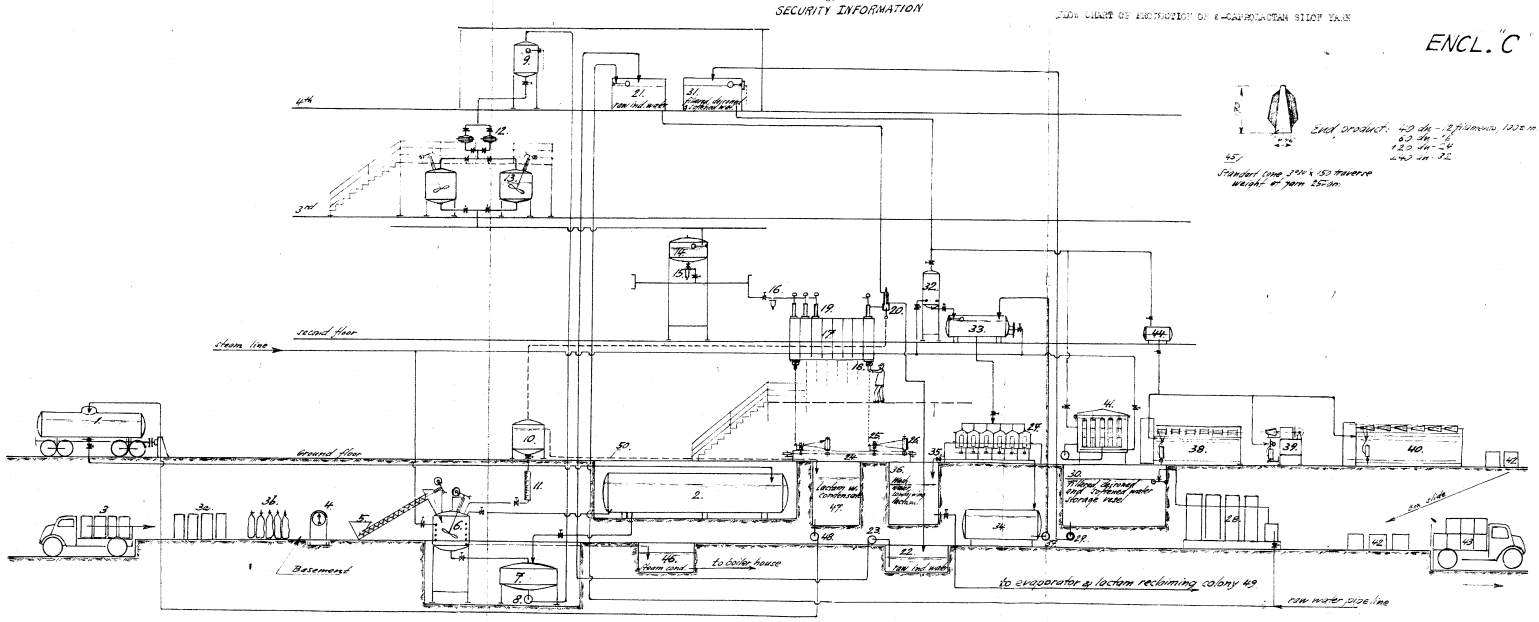
25X1

Legend
(Numbers below 50 to be looked up in legend to Enclosure C)

161. Cam and drive box
162. Driven disk
163. Driving wheel
164. Camshaft
165. Yarn brake
166. Sizing roll
167. Gearing
168. Traversing guide
169. Traversing eyelet
170. Cone-fastening lever
171. Starting lever
172. Driving pulley
173. Tension sheave
174. Twisting spindle
175. Foot brake
176. Spindle shaft

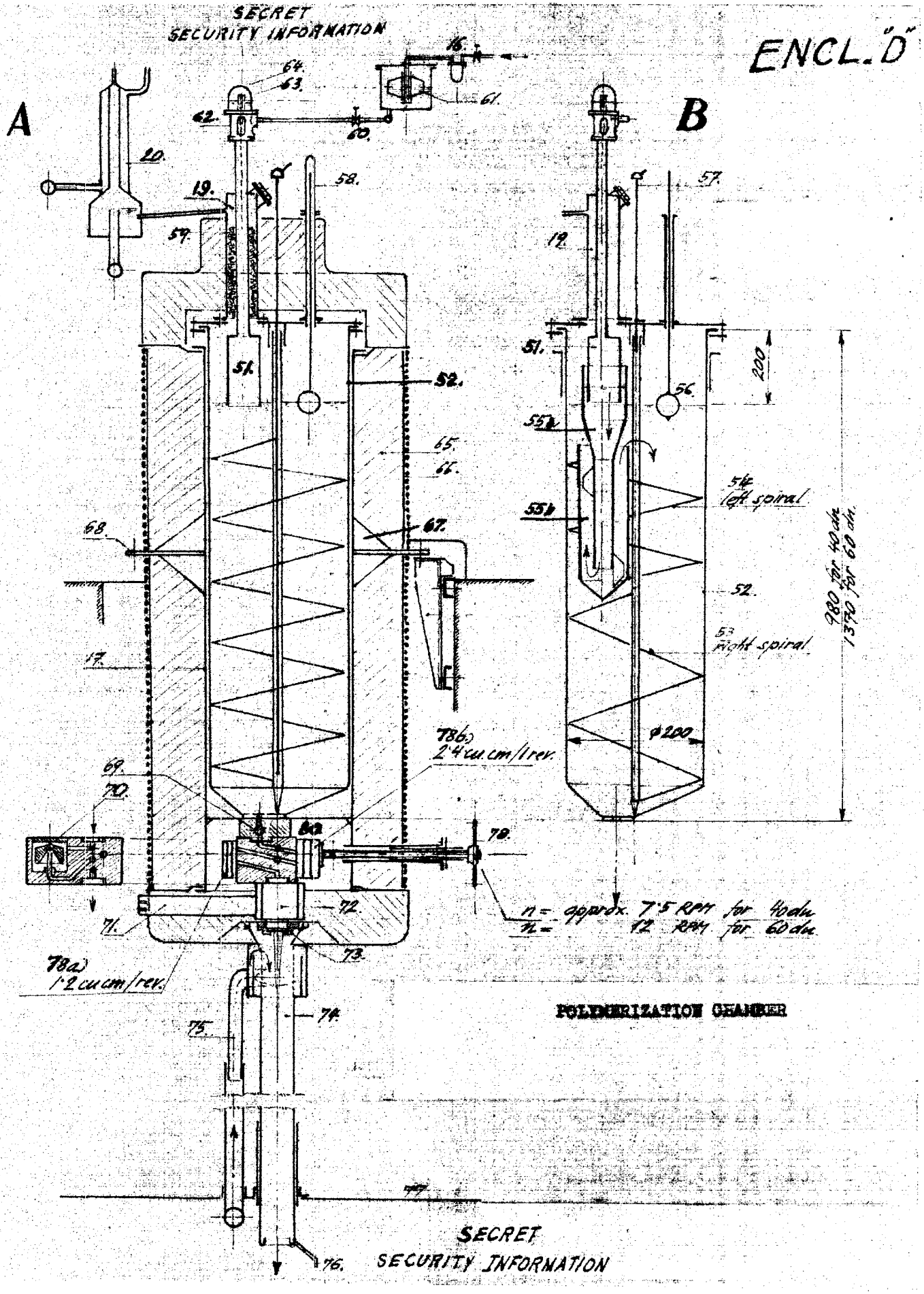
FLOW CHART OF PRODUCTION OF ε-CAPROLACTAM SILOX PLANT

ENCL. "C"



SECRET
SECURITY INFORMATION

ENCL. "D"



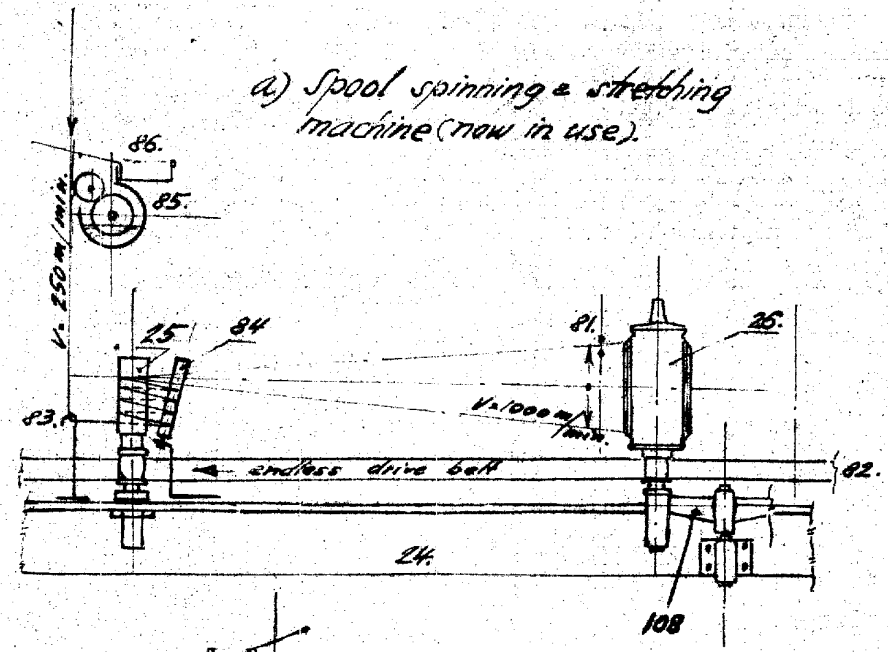
POLYMERIZATION CHAMBER

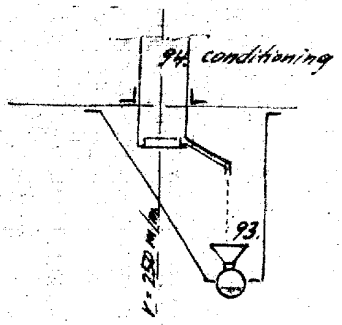
SECRET
SECURITY INFORMATION

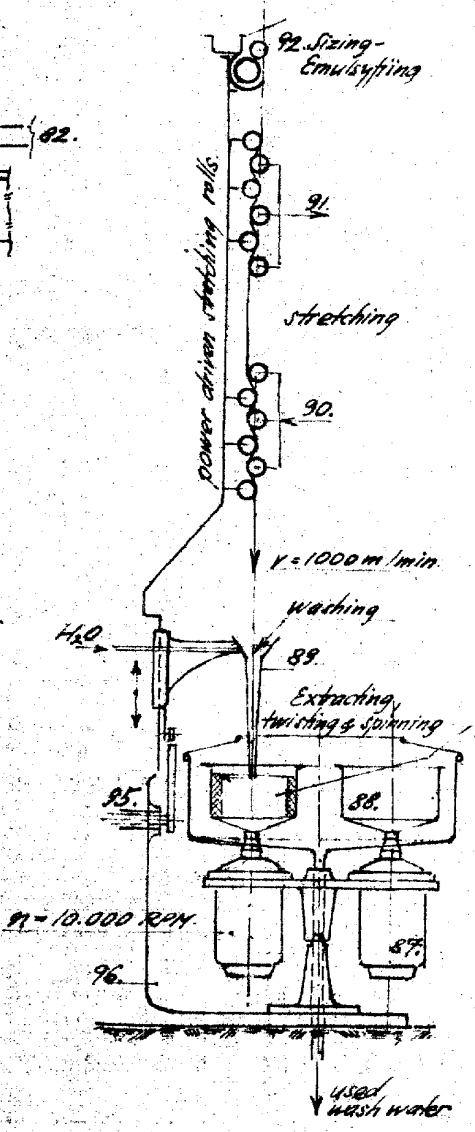
SECRET
SECURITY INFORMATION

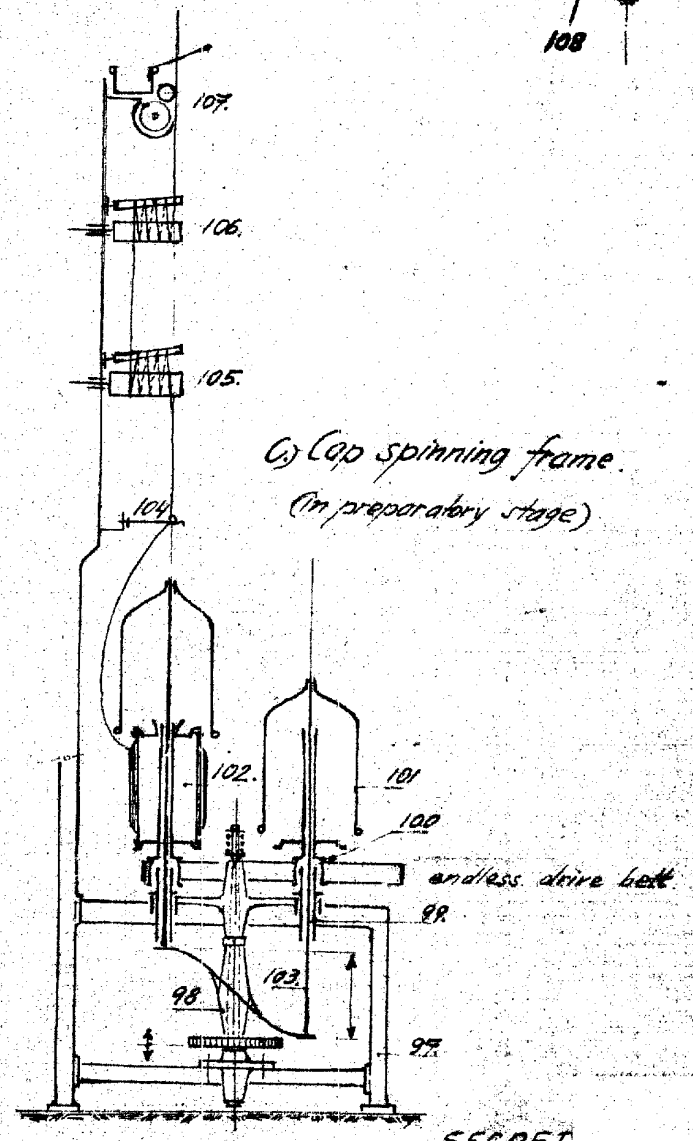
ENCL. "E"

SPINNING AND STRETCHING MACHINERY









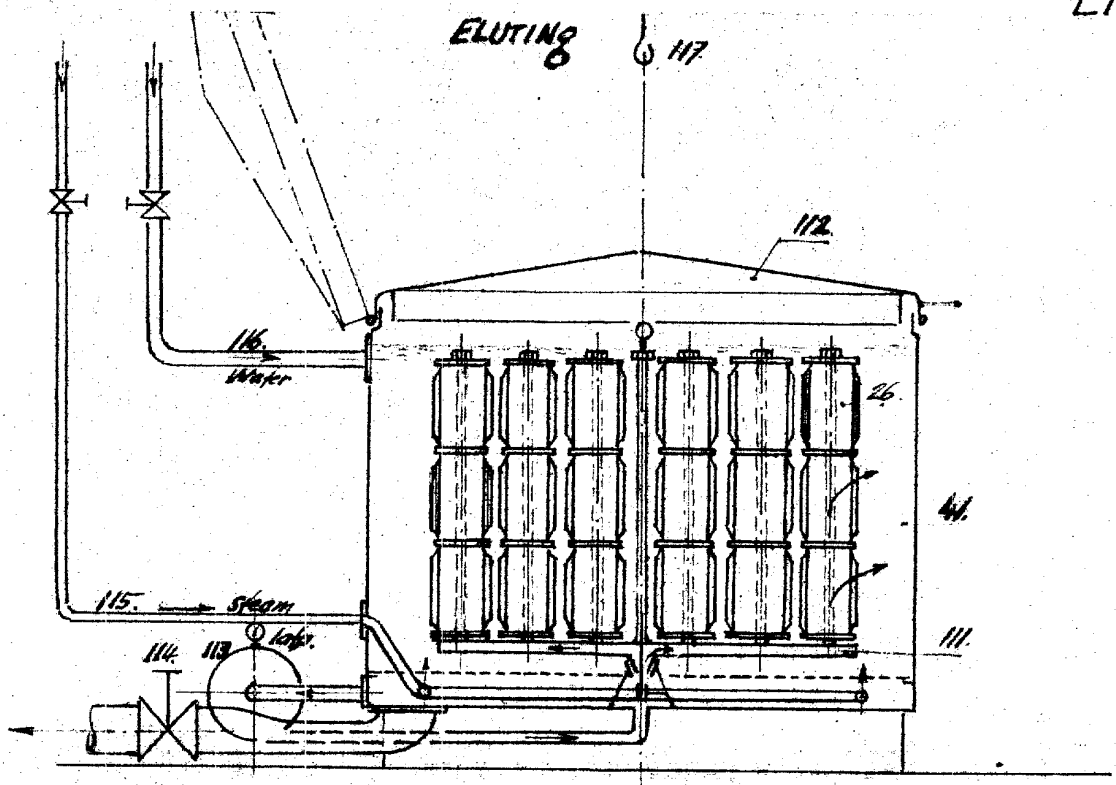
b) Experimental pot spinning machine (being in trial stage)

SECRET
SECURITY INFORMATION

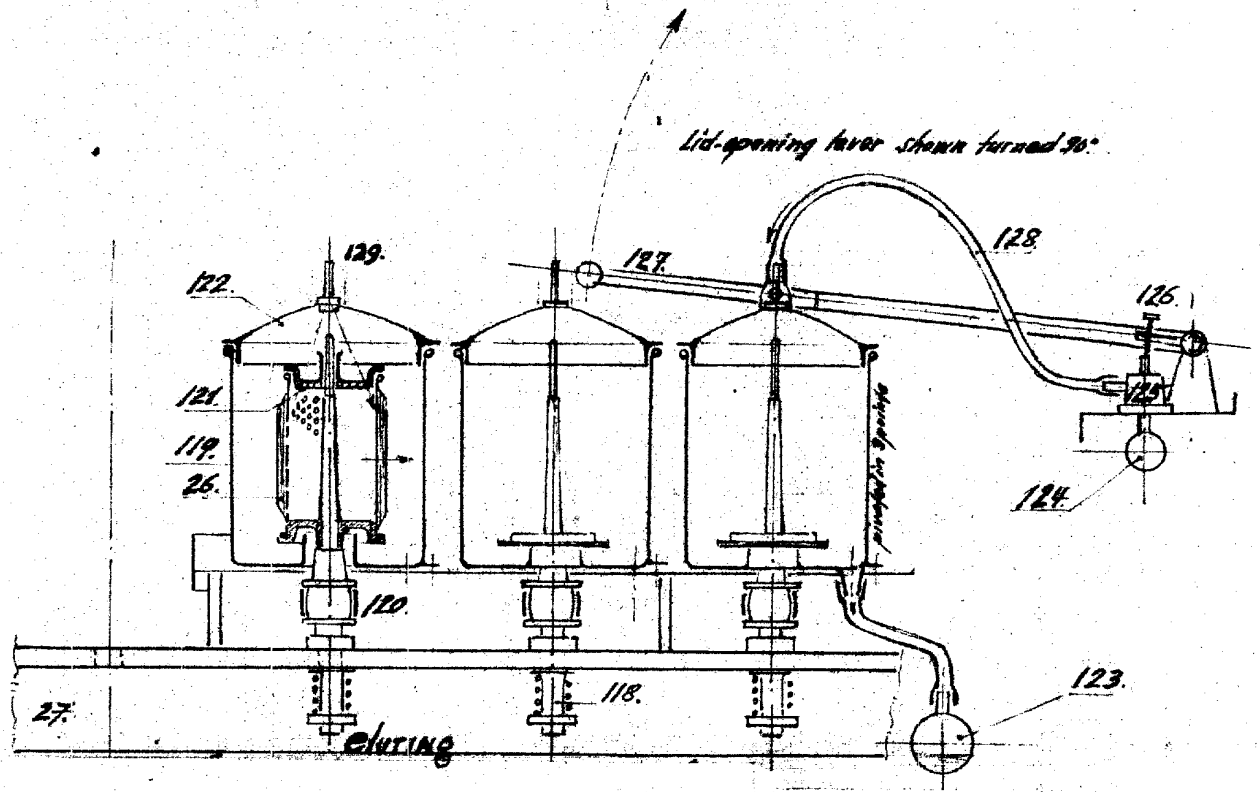
SECURITY INFORMATION

MÜNCHEN [redacted] MACHINES

ENCL. "F"



a) Pressure washing machine

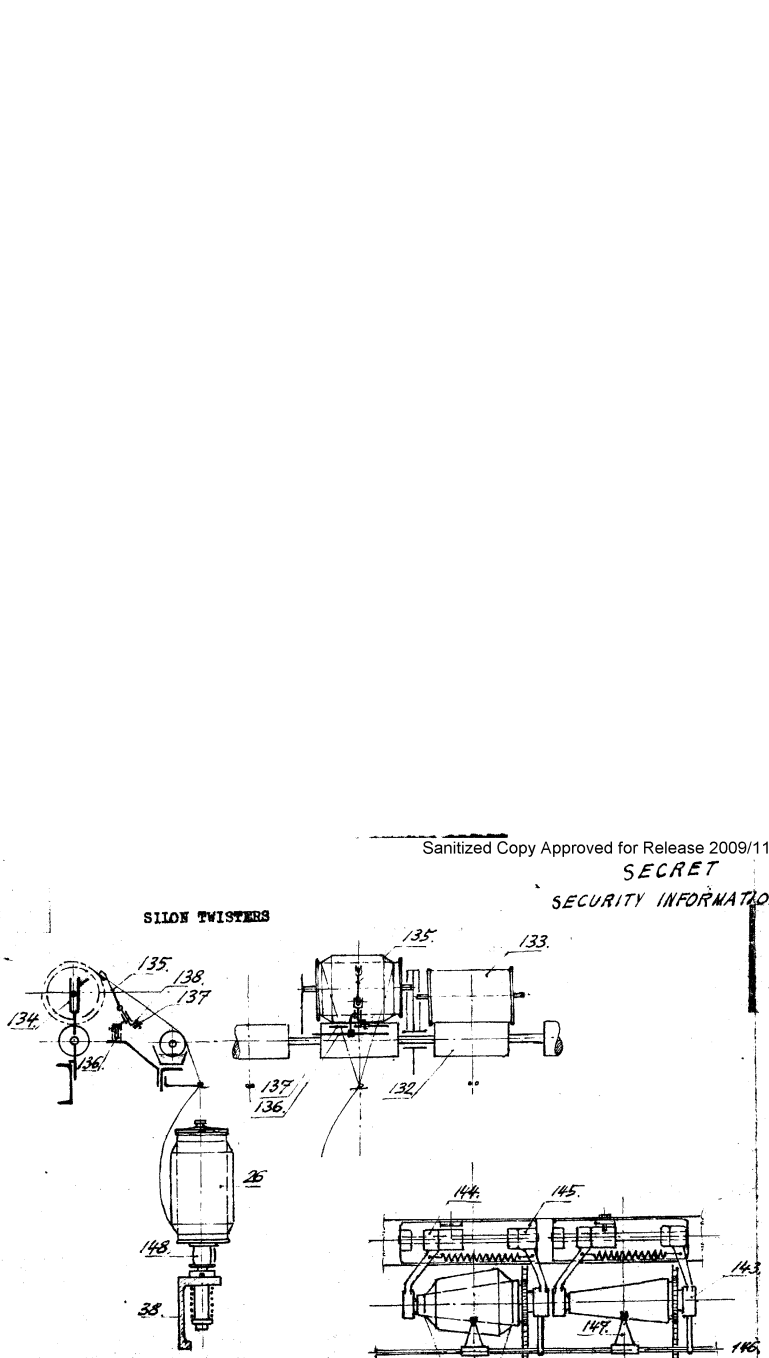


b) Centrifugal [redacted] machine

SECRET
SECURITY INFORMATION

ENCL. "6"

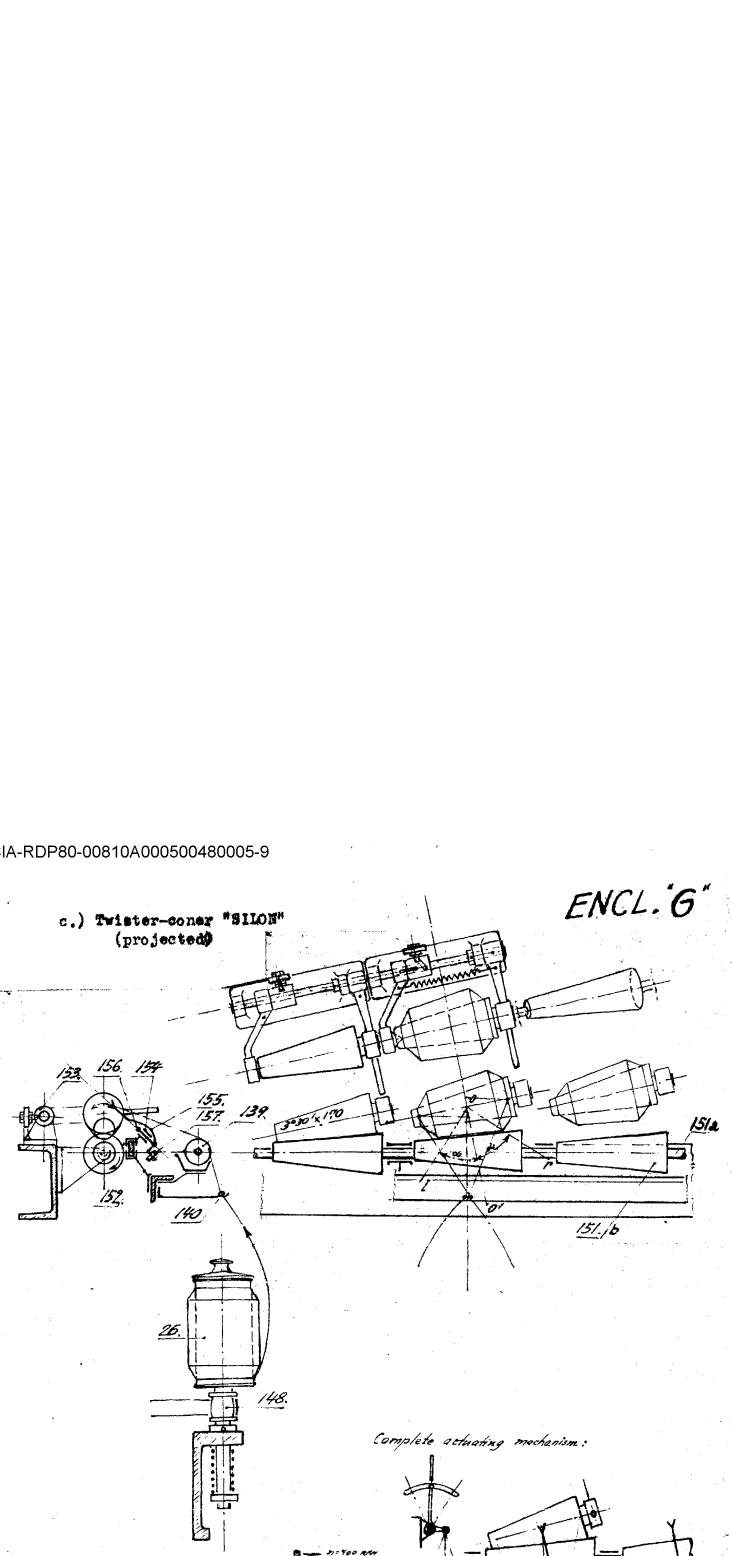
SILON TWISTERS



a.) Ordinary twister adapted for pineapple packages.

b.) Twister-coner "PARCOFIL"

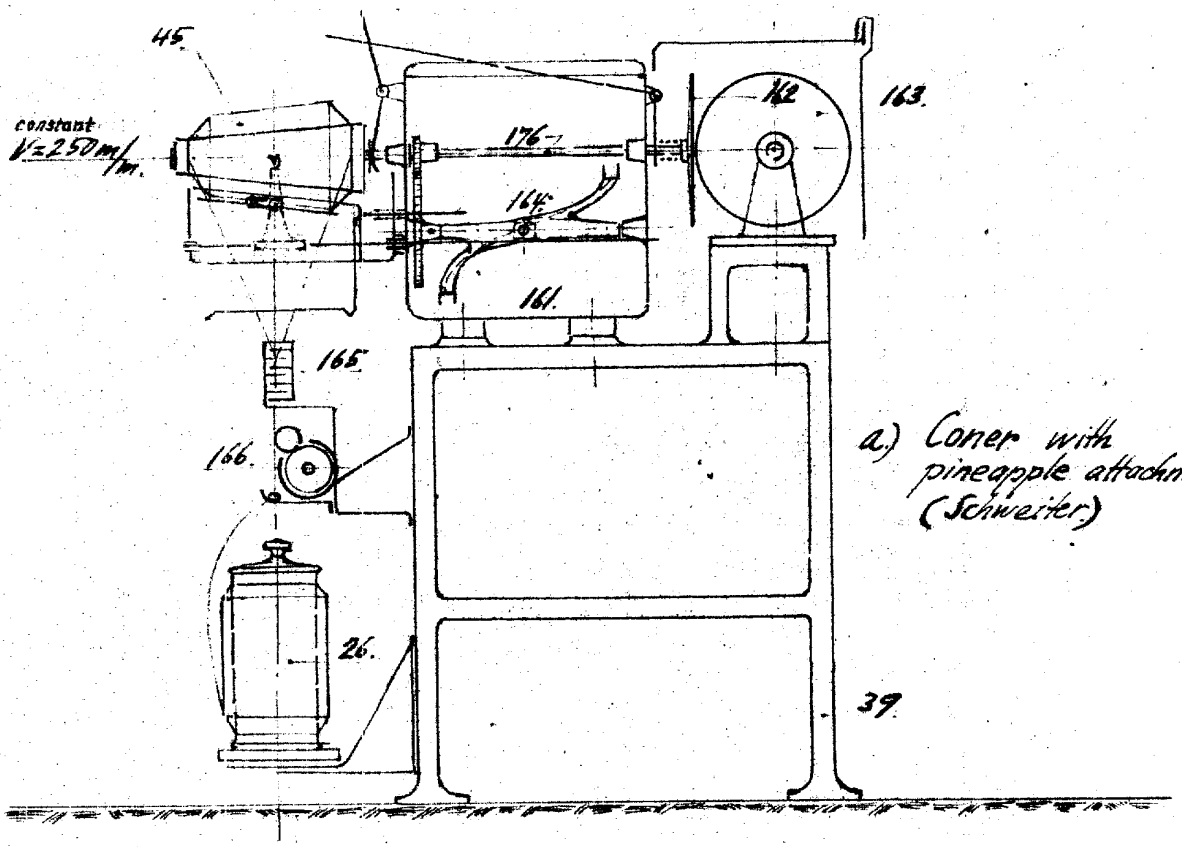
c.) Twister-coner "SILON" (projected)



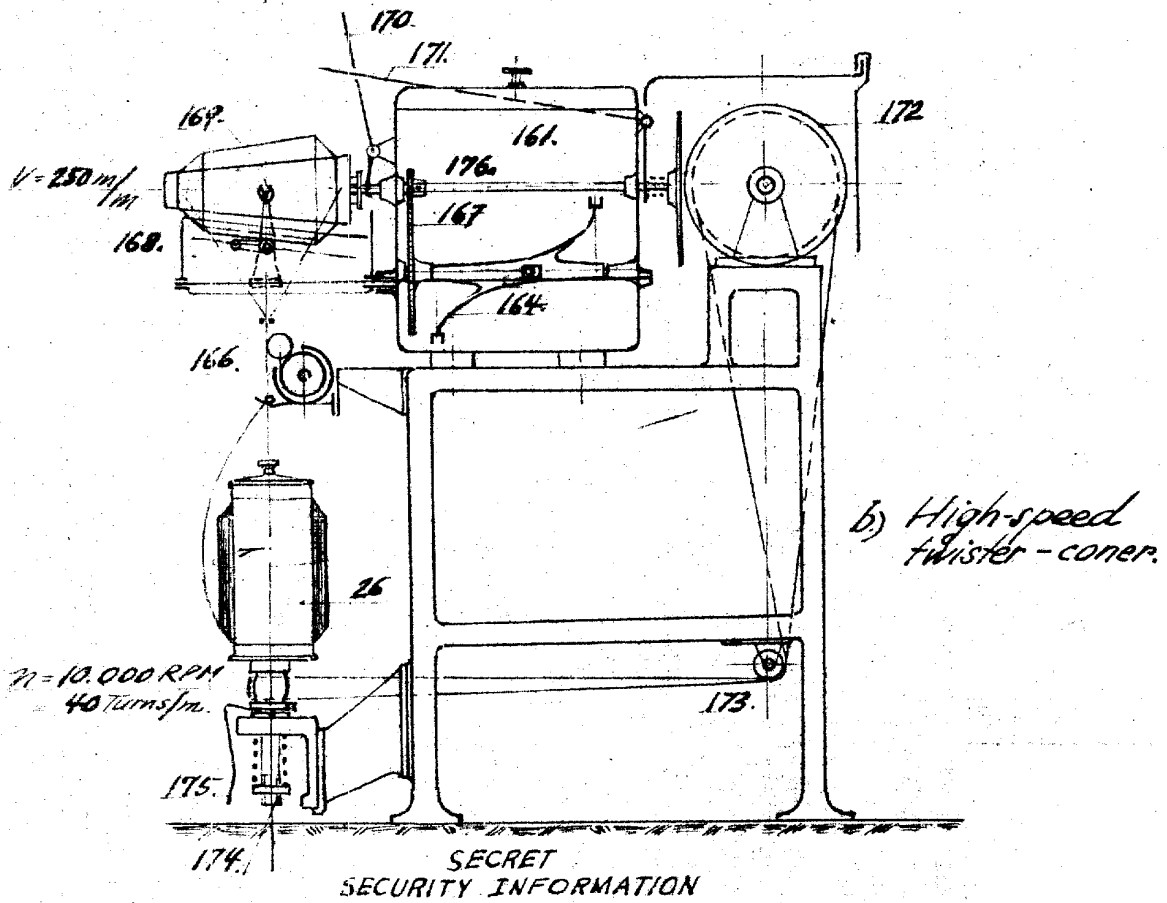
SECRET
SECURITY INFOMATION

ILON COMER AND HIGH-SPEED TWISTER-COMER

ENCL. "H"



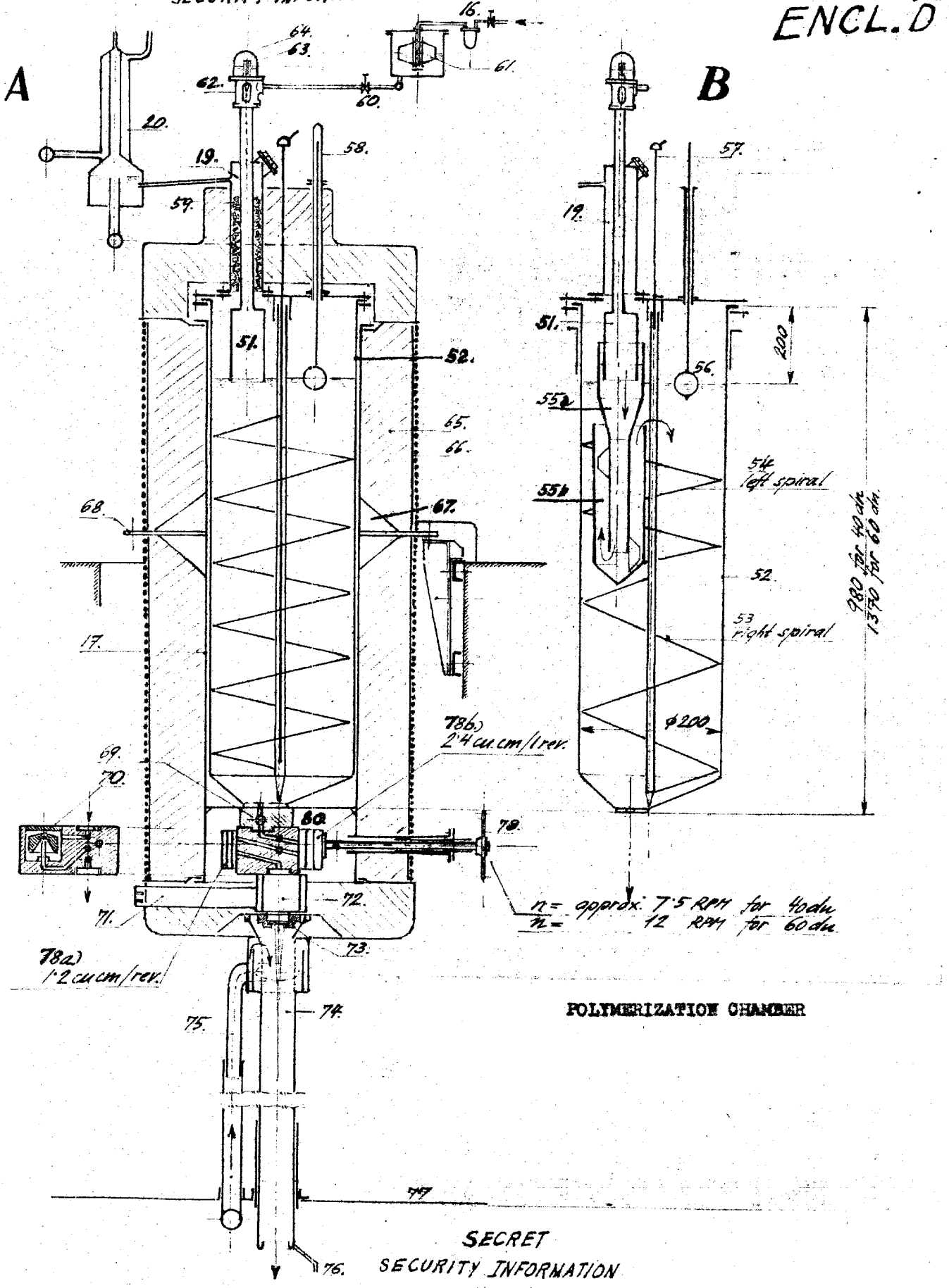
a.) Coner with pineapple attachment (Schweiter)



b) High-speed twister-coner.

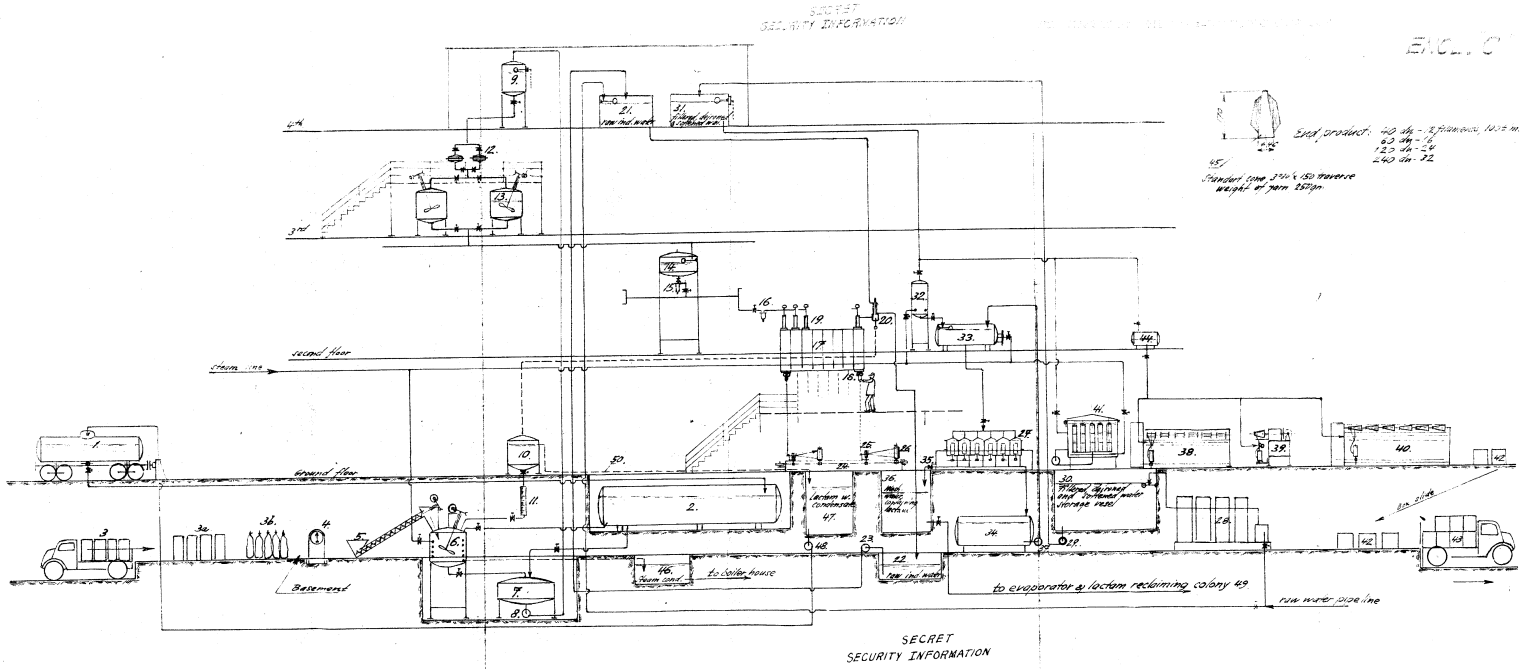
SECRET
SECURITY INFORMATION

ENCL. "D"



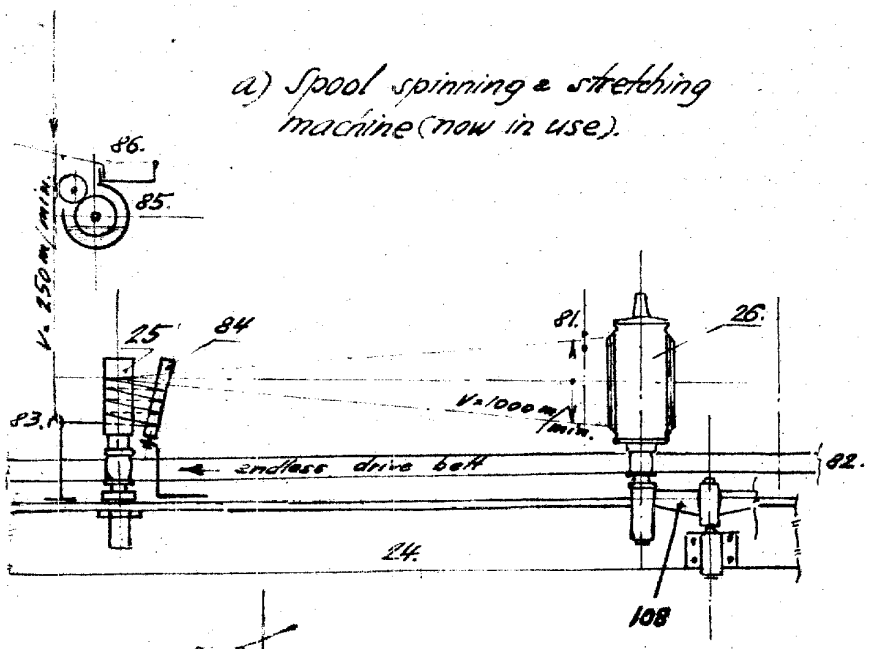
POLYMERIZATION CHAMBER

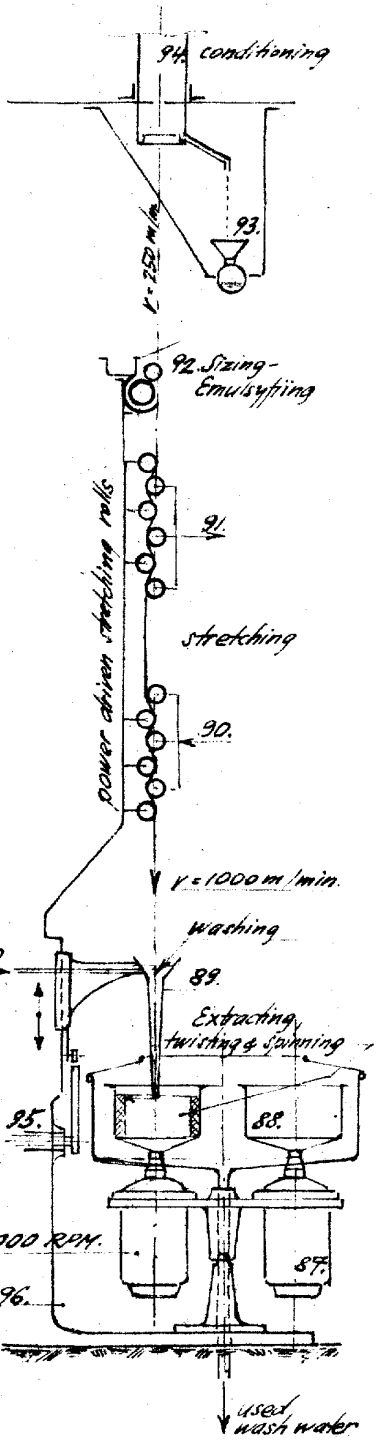
FIG. 6

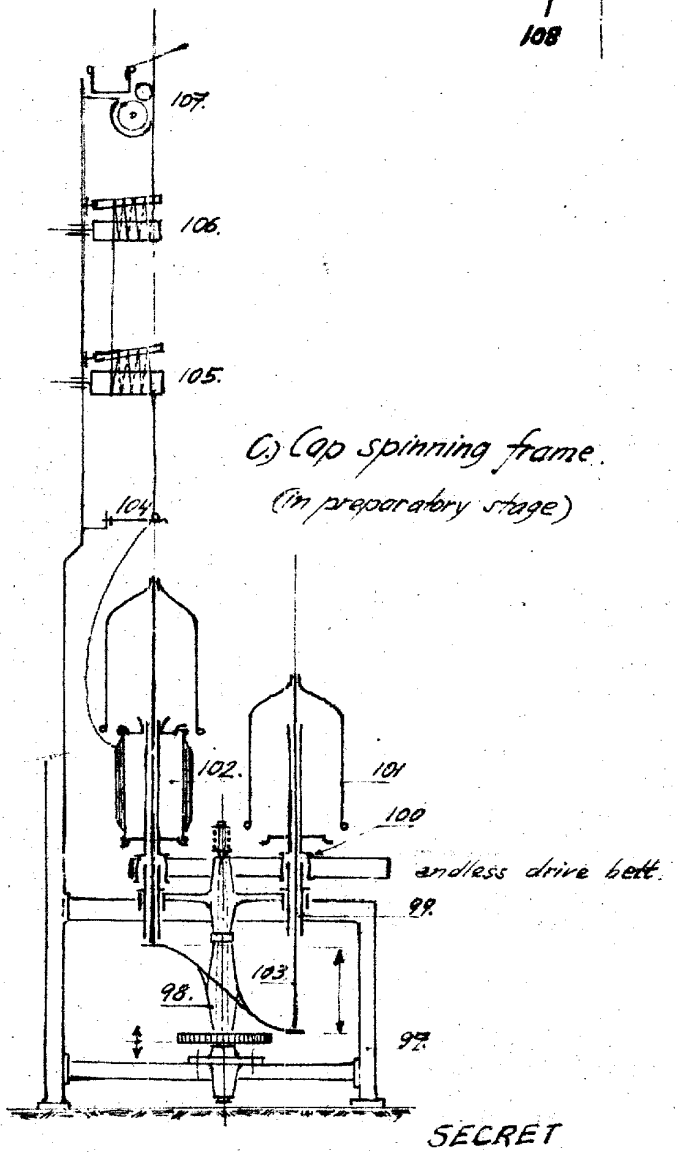


ENCL. "E"

SPINNING AND STRETCHING MACHINERY







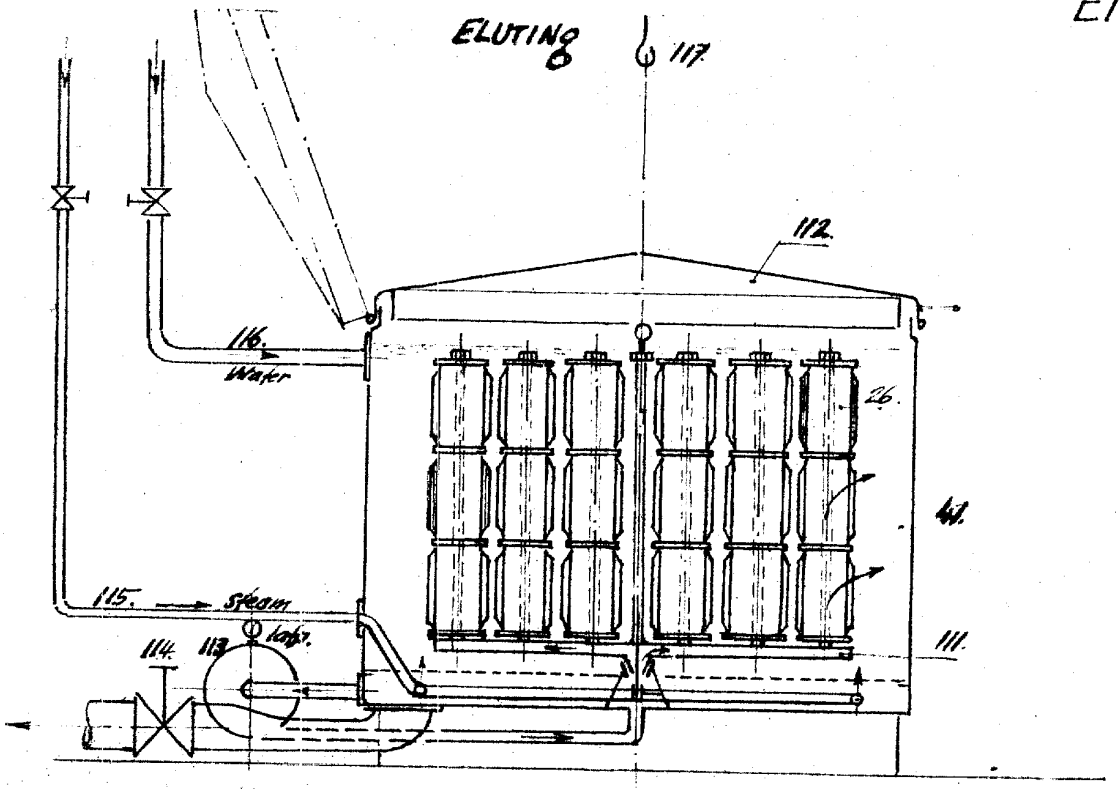
b) Experimental pot spinning machine (being in trial stage)

SECRET
SECURITY INFORMATION

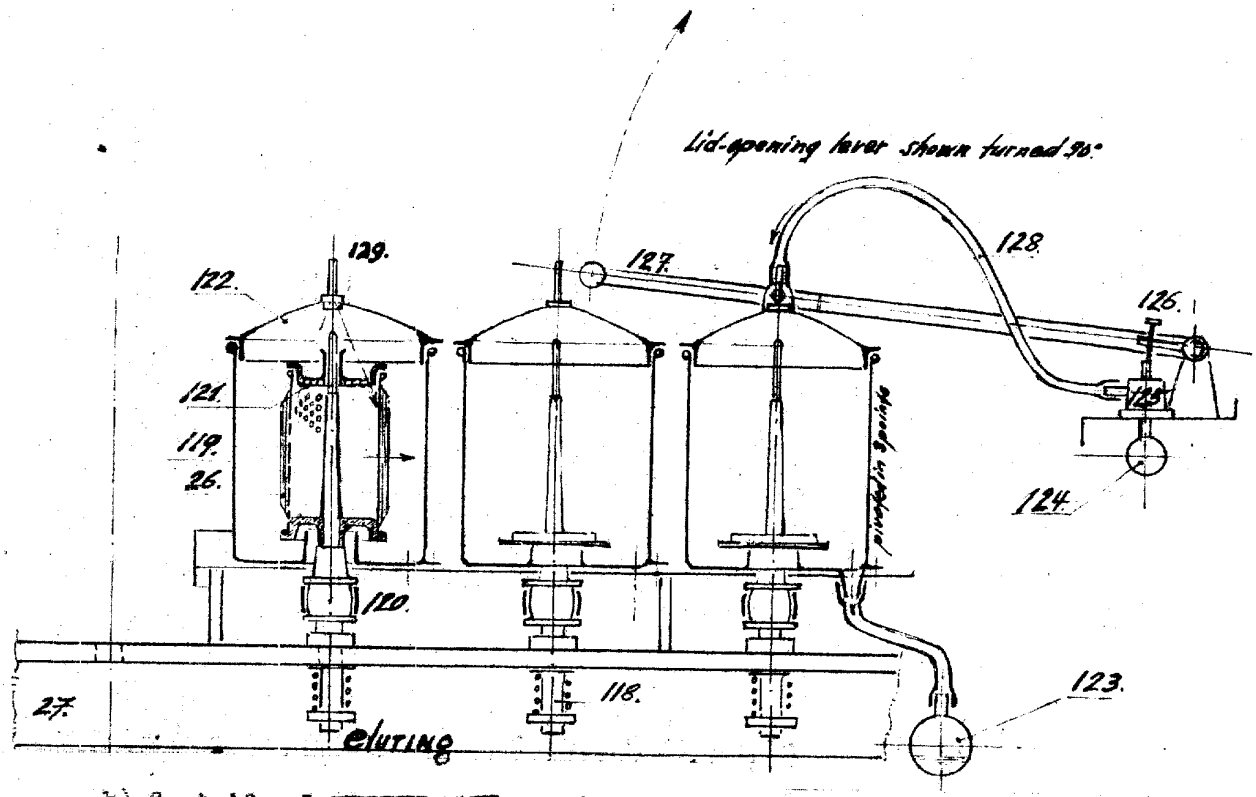
SECRET
SECURITY INFORMATION

[redacted] MACHINES

ENCL. "F"



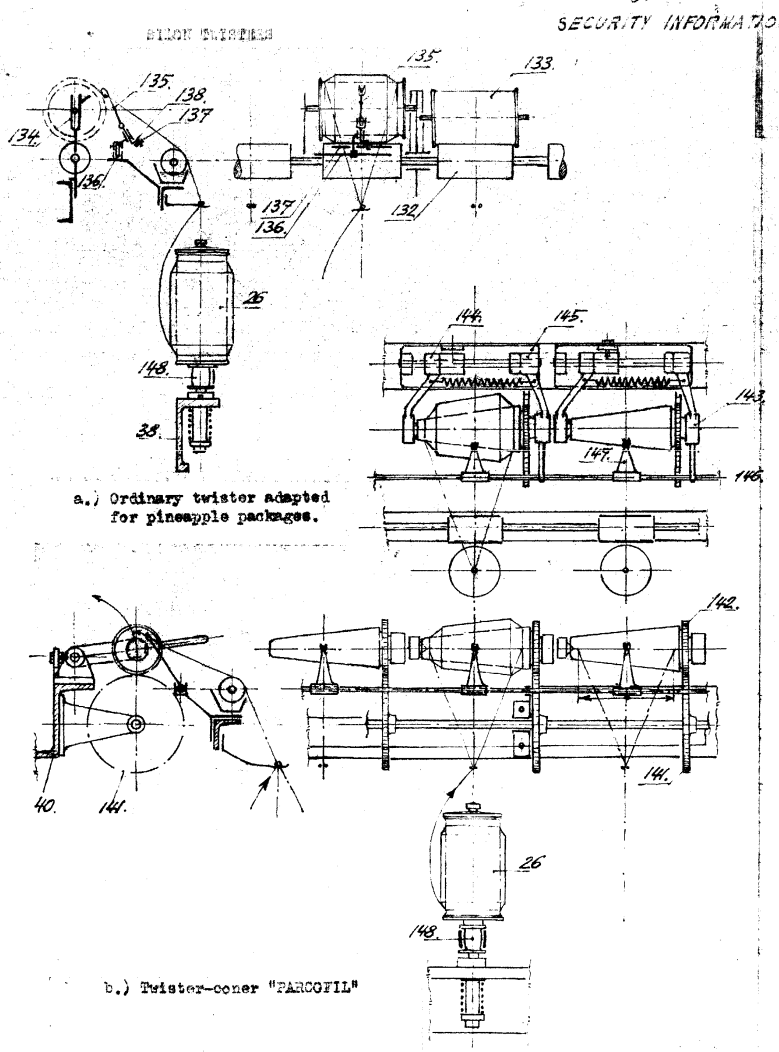
a) Pressure washing machine

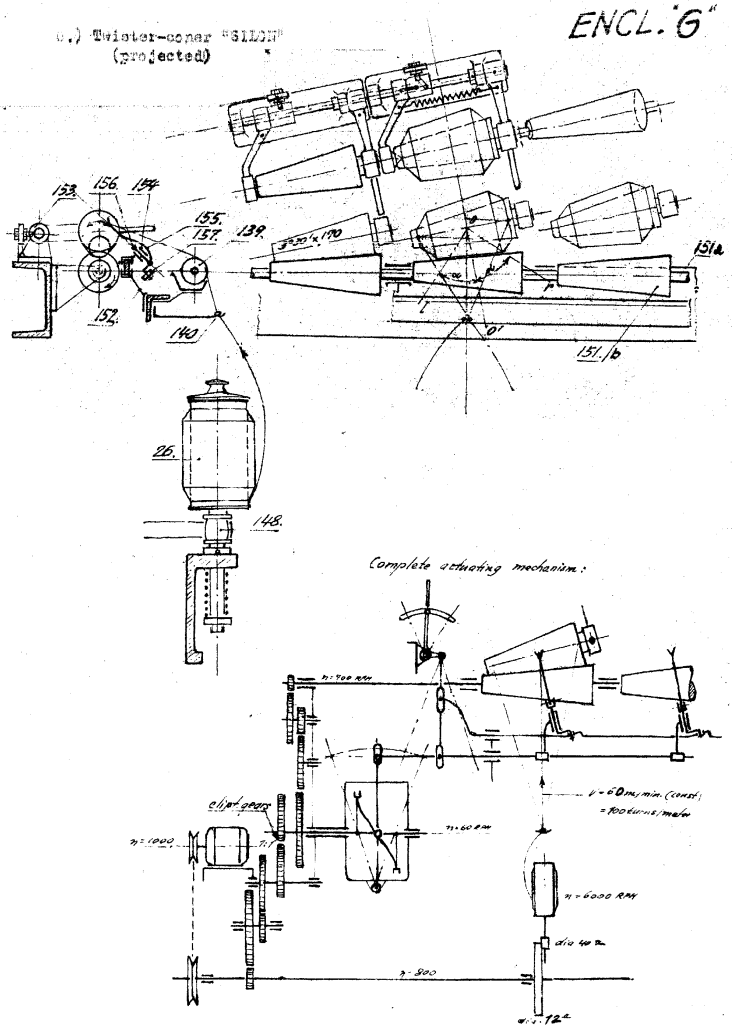


b) Centrifugal [redacted] machine

SECRET
SECURITY INFORMATION

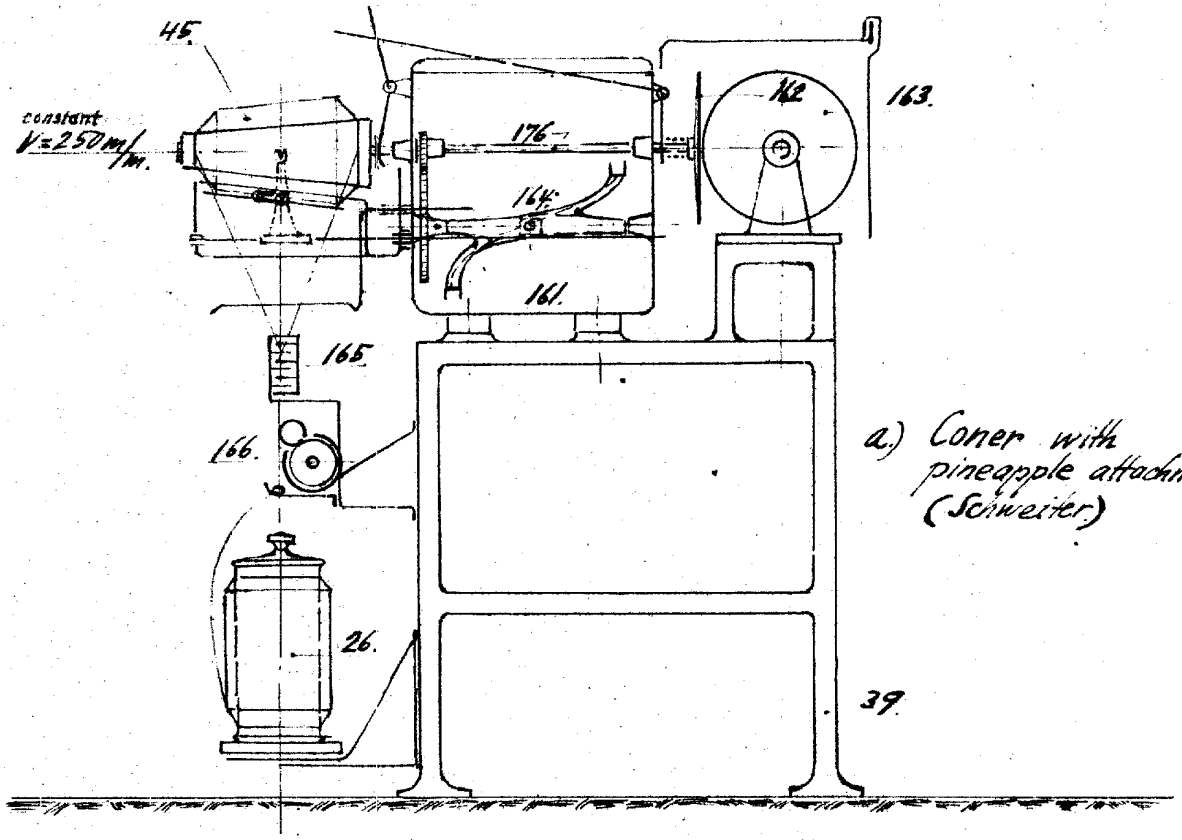
ENCL. "6"



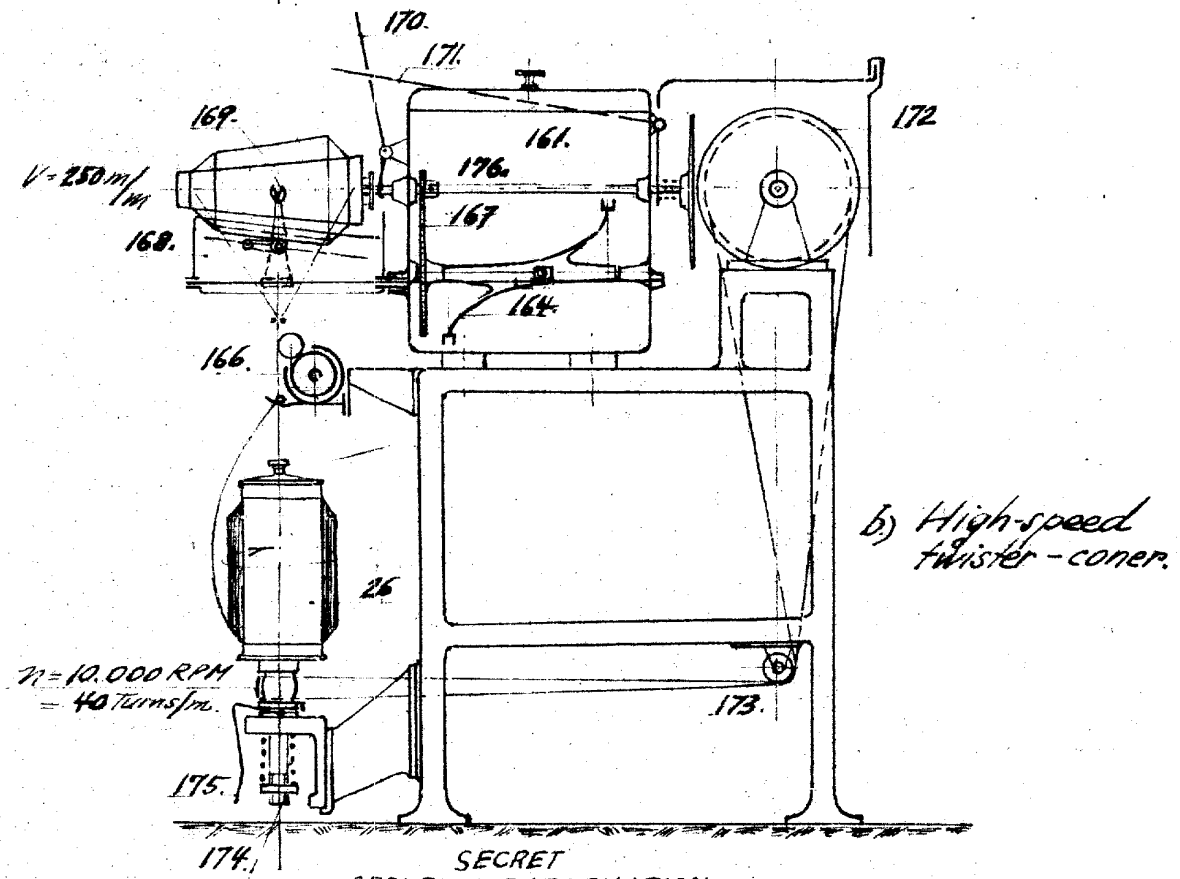


SILK CONER AND HIGH-SPEED TWISTER-CONER

ENCL. "H"



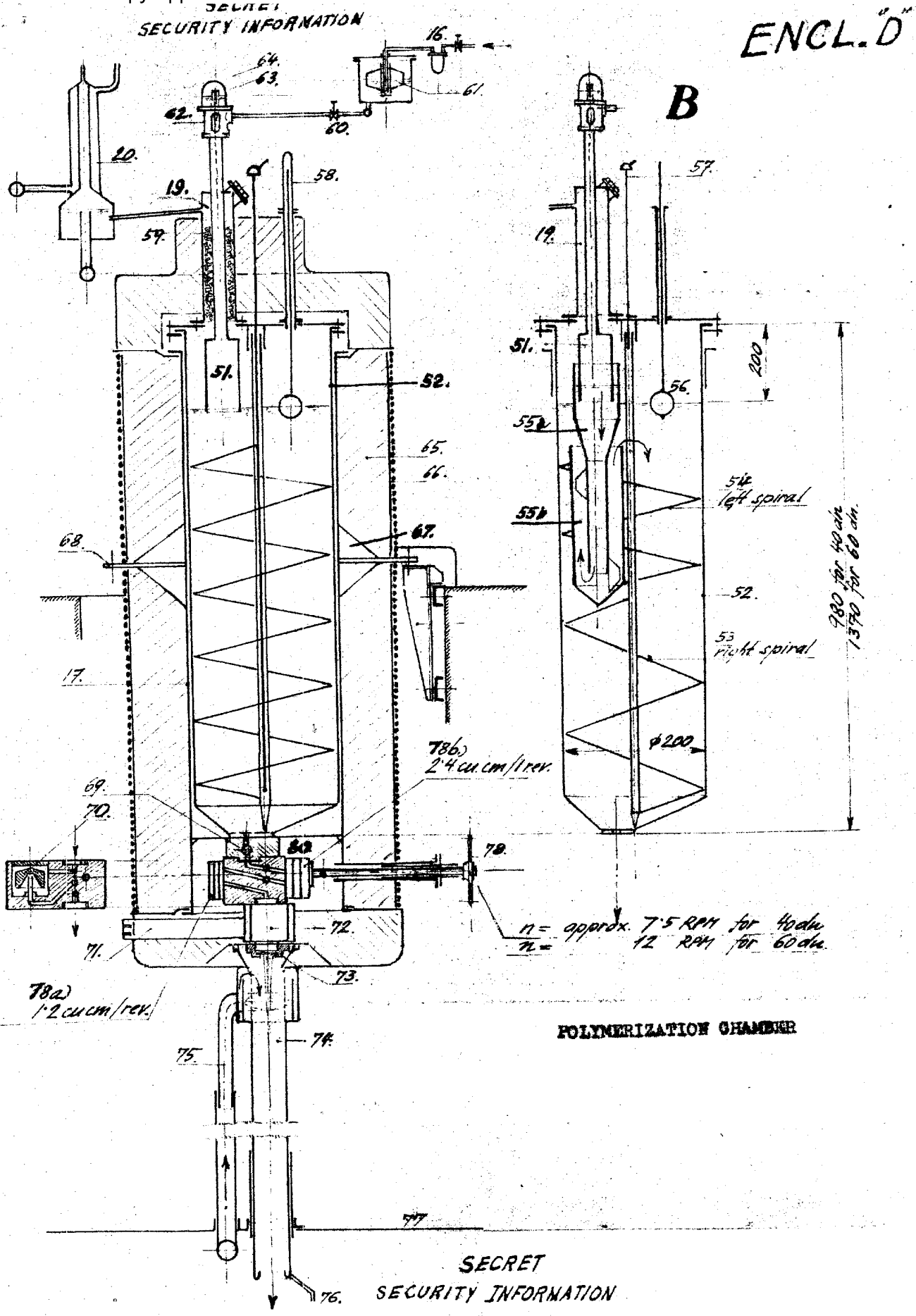
a.) Coner with pineapple attachment (Schweiter)



b.) High-speed twister-coner.

SECRET
SECURITY INFORMATION

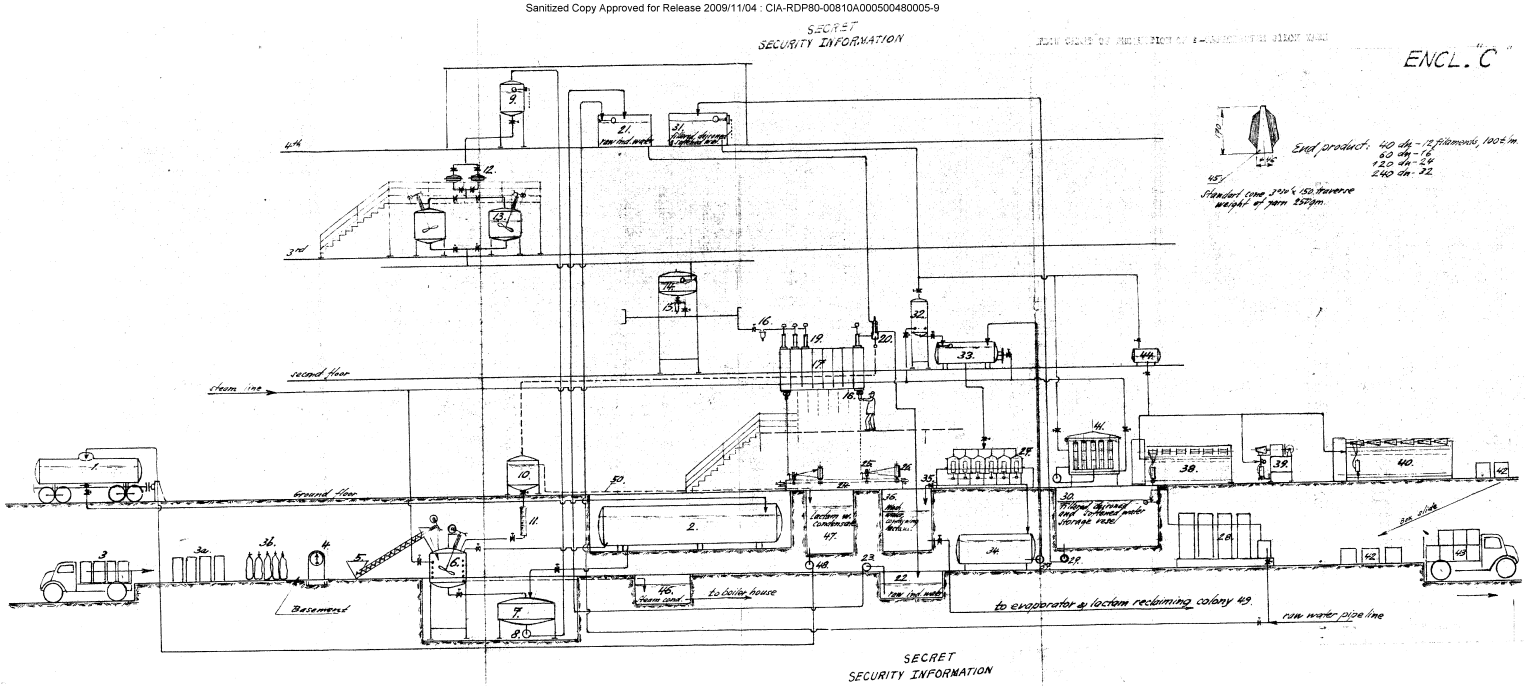
ENCL. "D"



POLYMERIZATION CHAMBER

SECRET
SECURITY INFORMATION

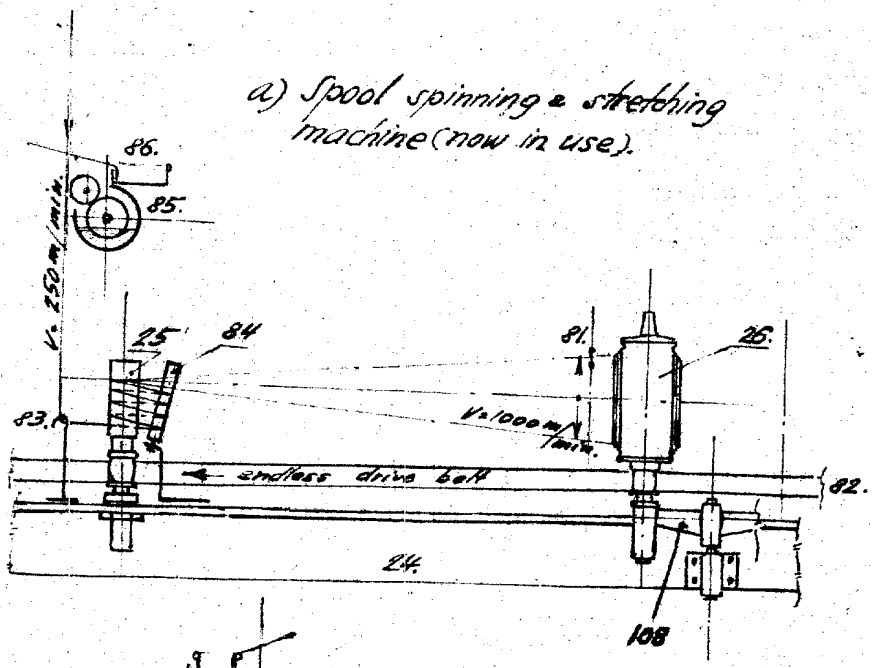
ENCL. "C"

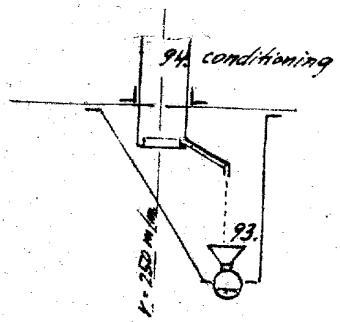


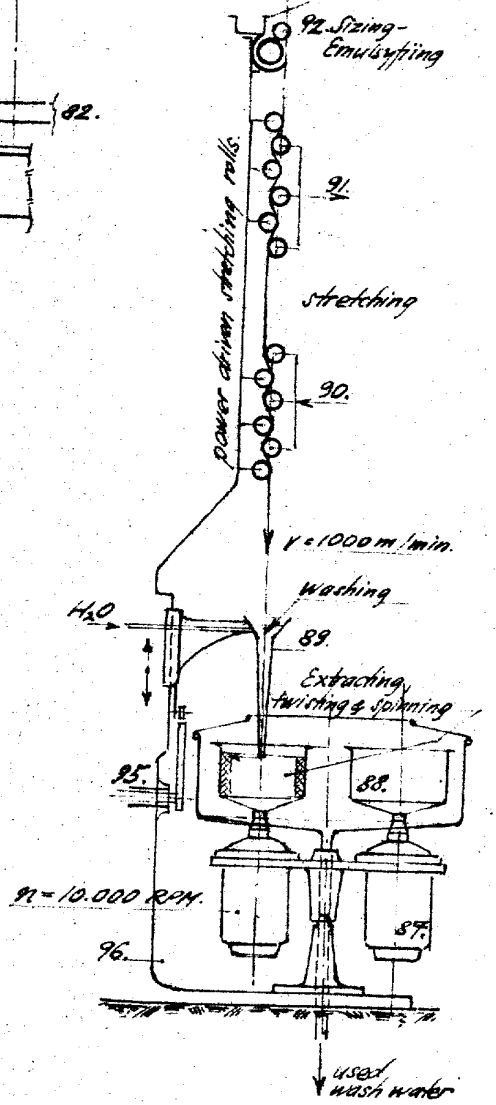
SECRET
SECURITY INFORMATION

SPINNING AND STRETCHING MACHINERY

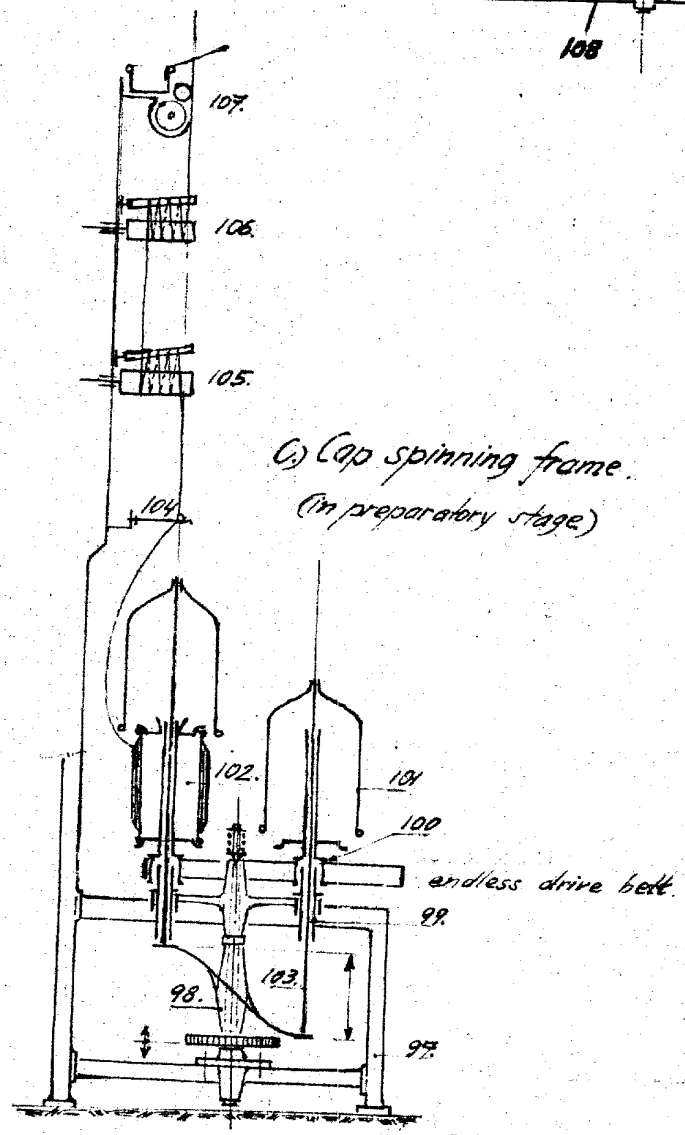
ENCL. "E"







b) Experimental pot spinning machine (being in trial stage)

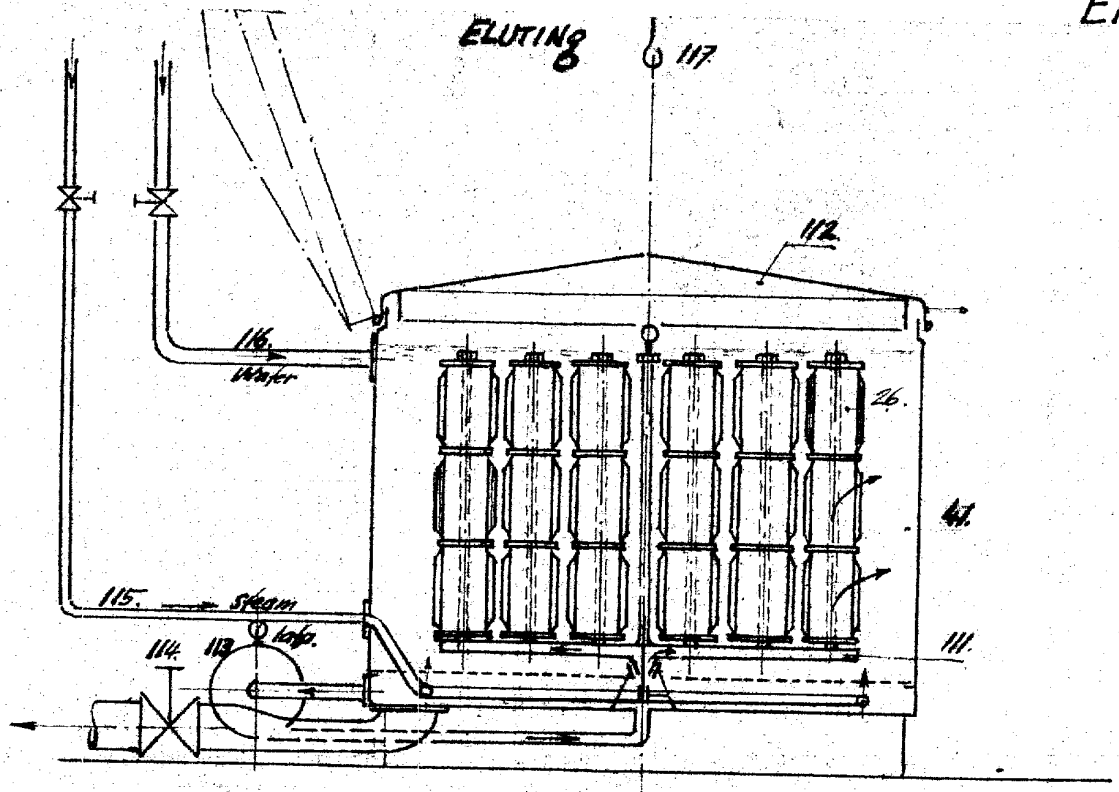


SECRET
SECURITY INFORMATION

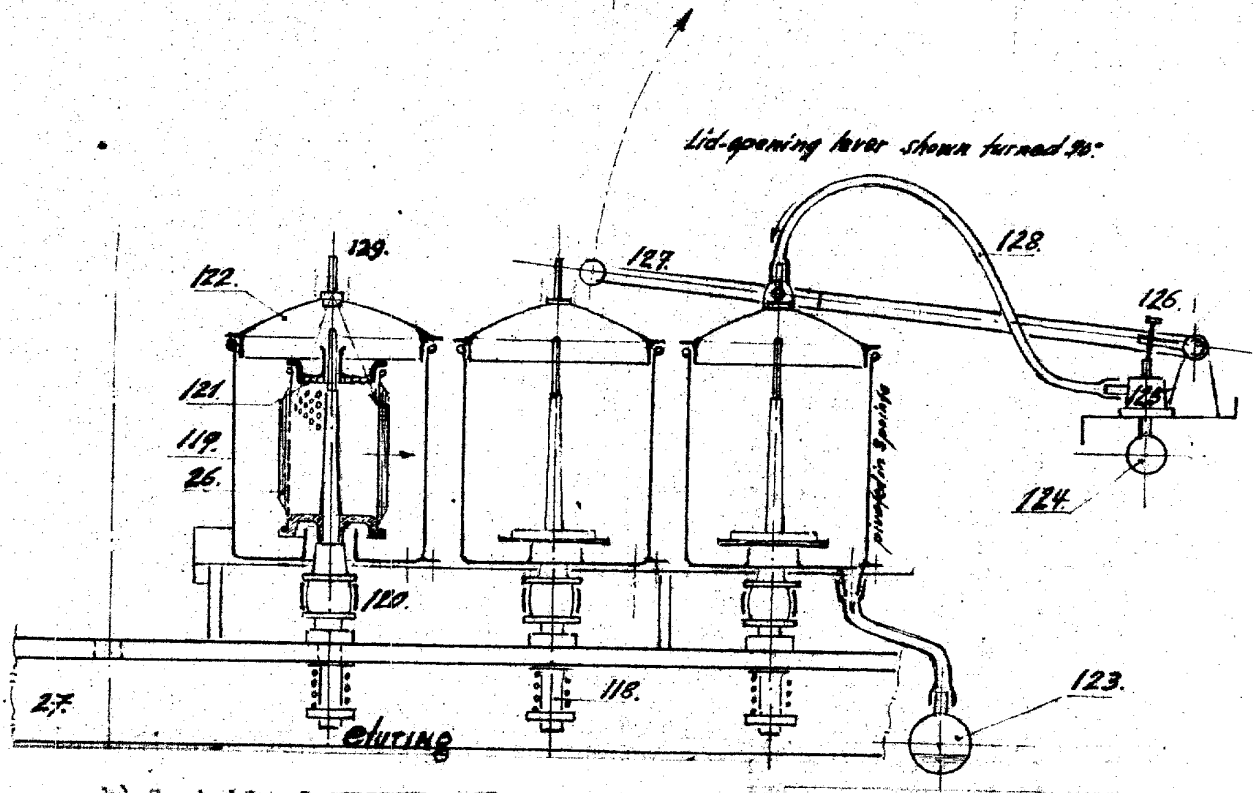
SECURITY INFORMATION

MONOMER [redacted] MACHINES

ENCL. "F"



a) Pressure washing machine

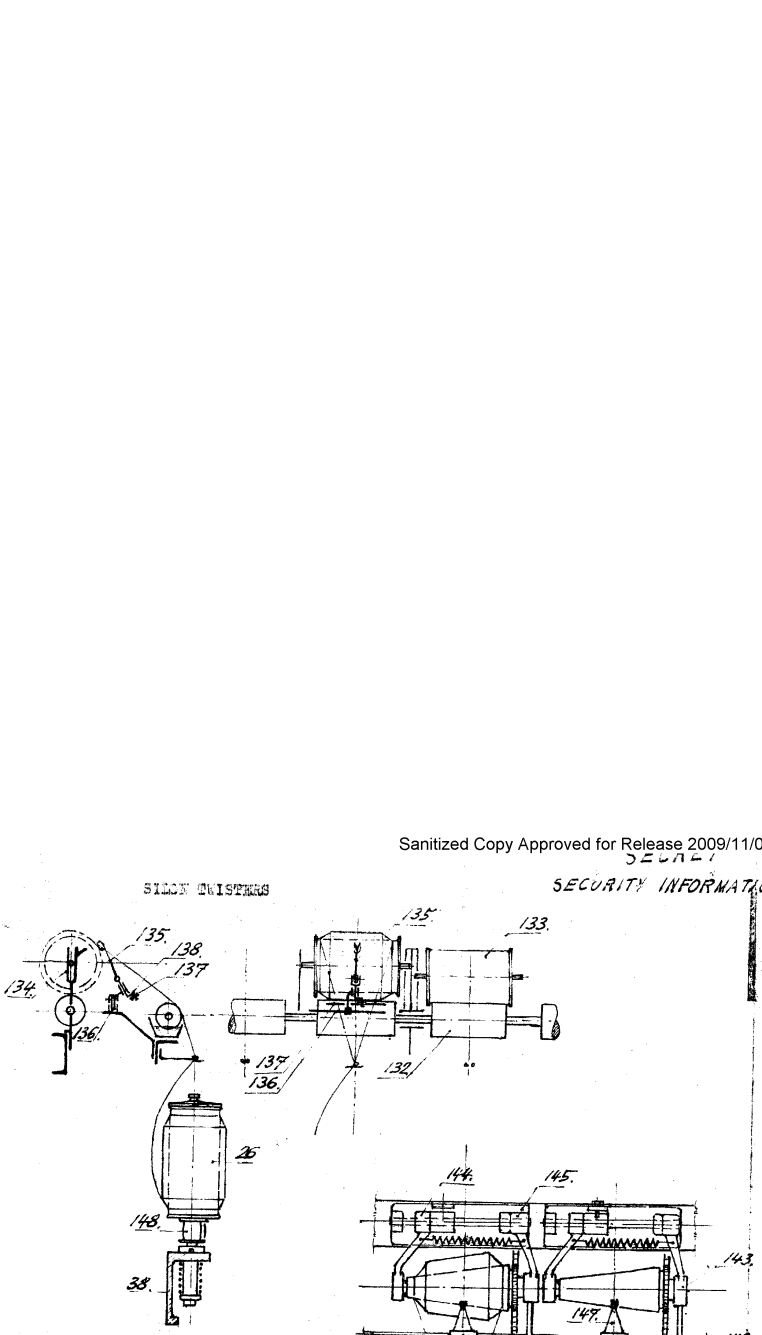


b) Centrifugal [redacted] machine

SECRET
SECURITY INFORMATION

SILON TWISTERS

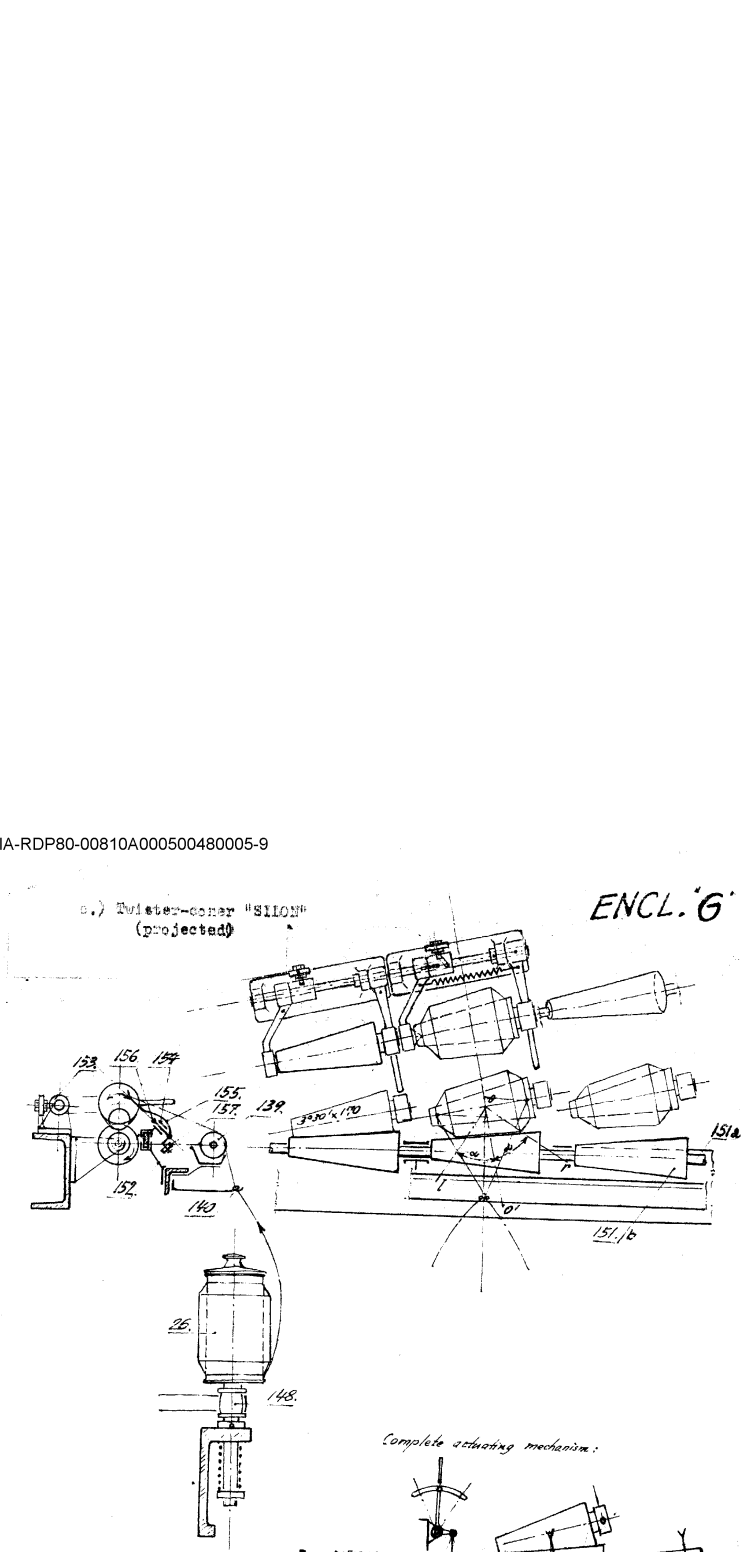
ENCL. '6'



a.) Ordinary twister adapted for pineapple packages.

b.) Twister-coner "PARCOFIL"

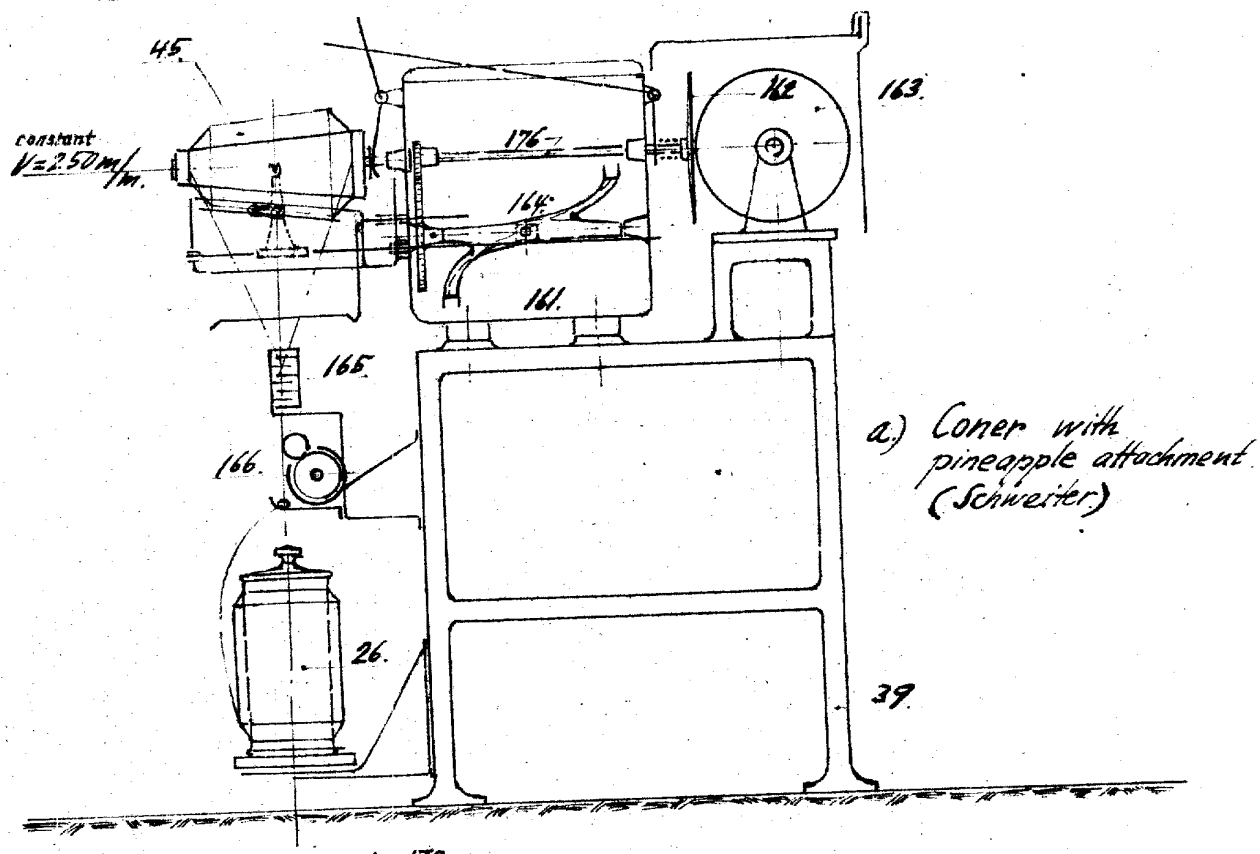
a.) Twister-coner "SILON" (projected)



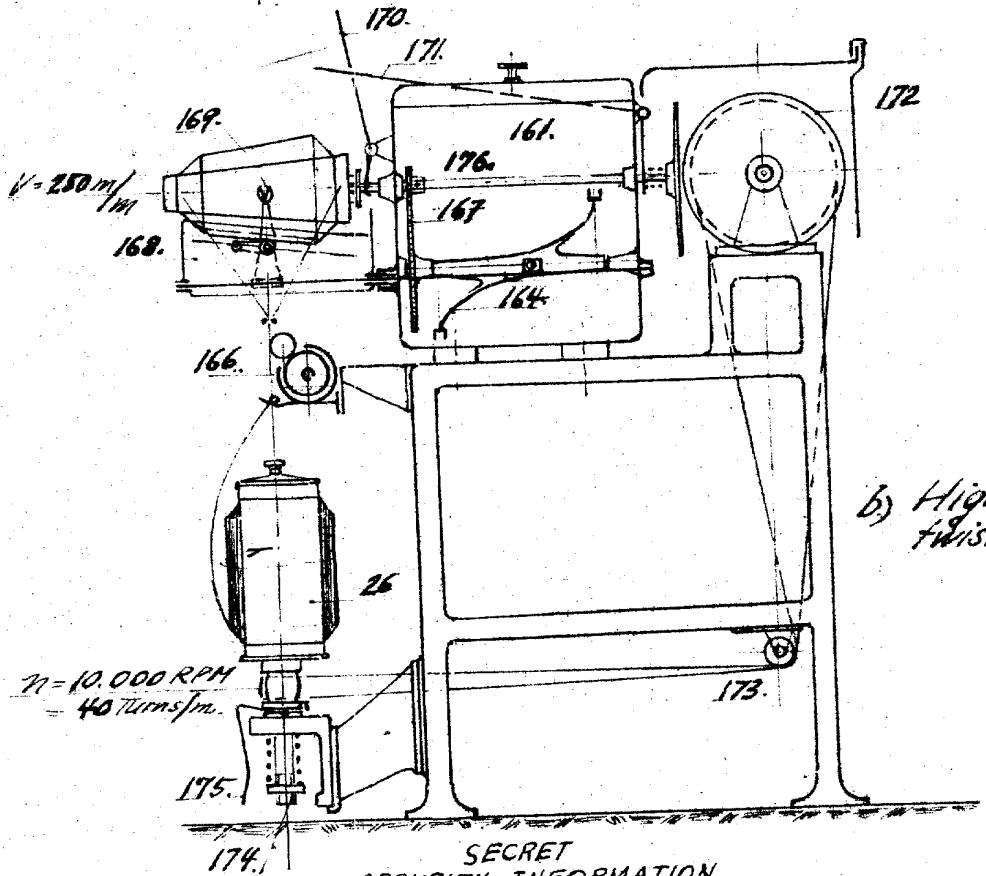
(3.-157.)

ENCL. "H"

SILOS CONER AND HIGH-SPEED TWISTER-CONER



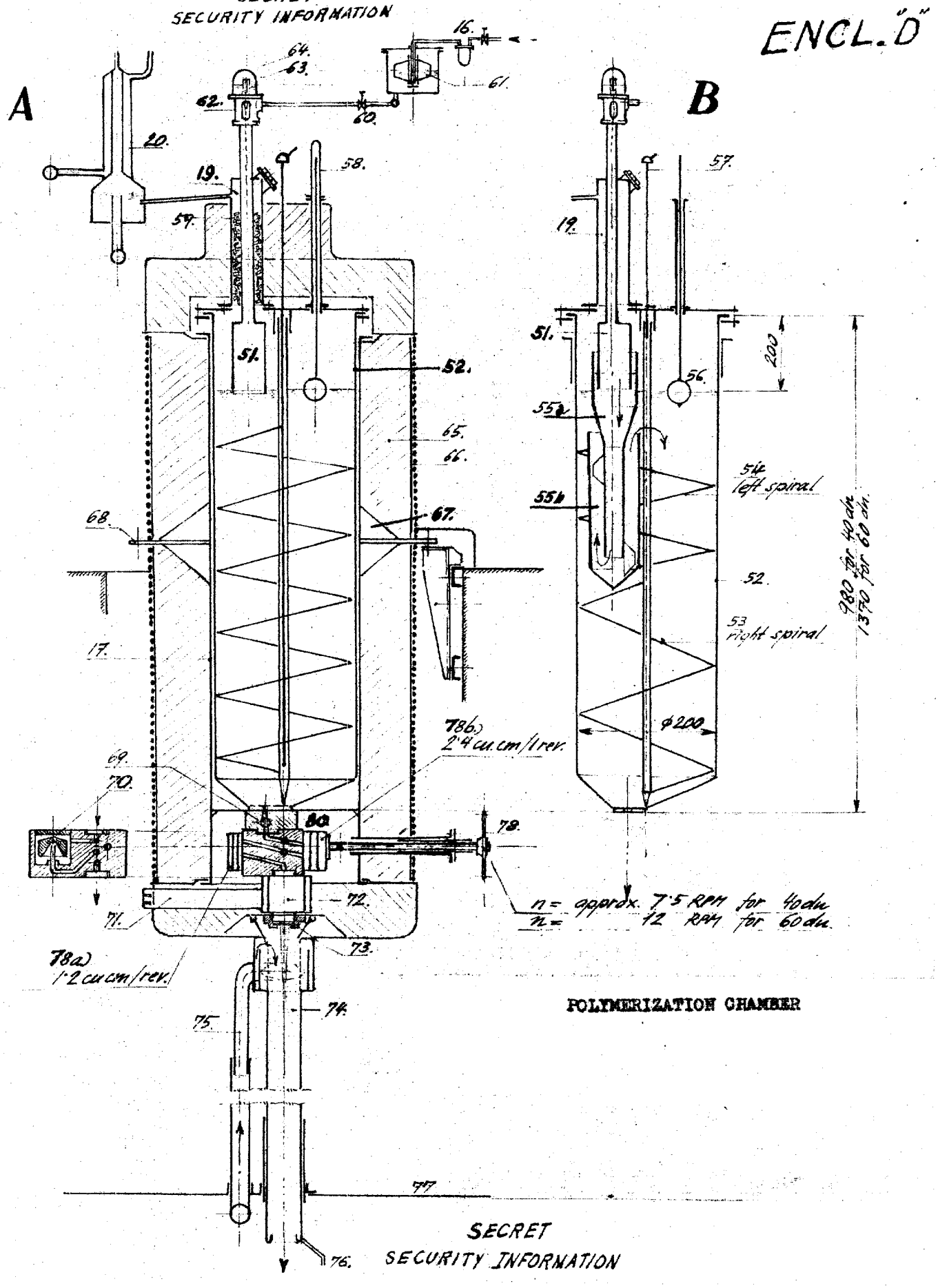
a.) Coner with pineapple attachment (Schweiter)



b.) High-speed twister-coner.

SECRET
SECURITY INFORMATION

ENCL. "D"



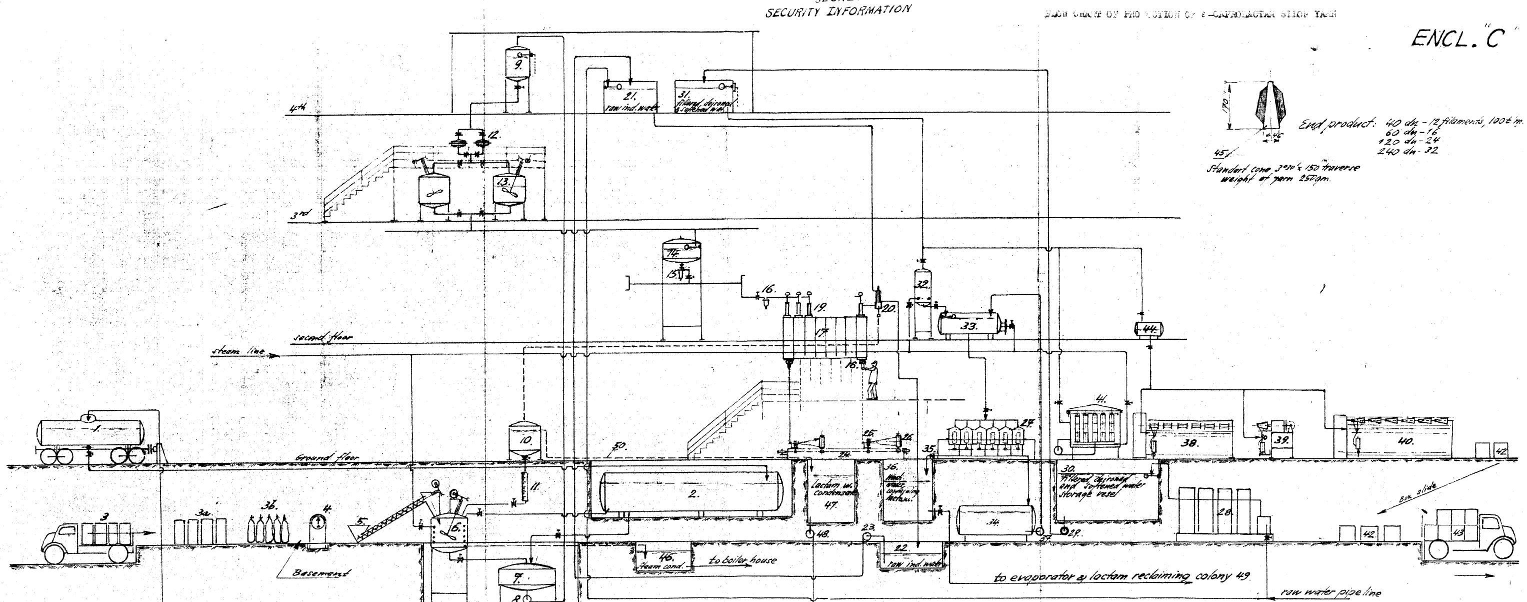
POLYMERIZATION CHAMBER

SECRET
SECURITY INFORMATION

SECRET
SECURITY INFORMATION

FLOW CHART OF PRODUCTION OF ε-CAPROLACTAM SILK YARN

ENCL. "C"

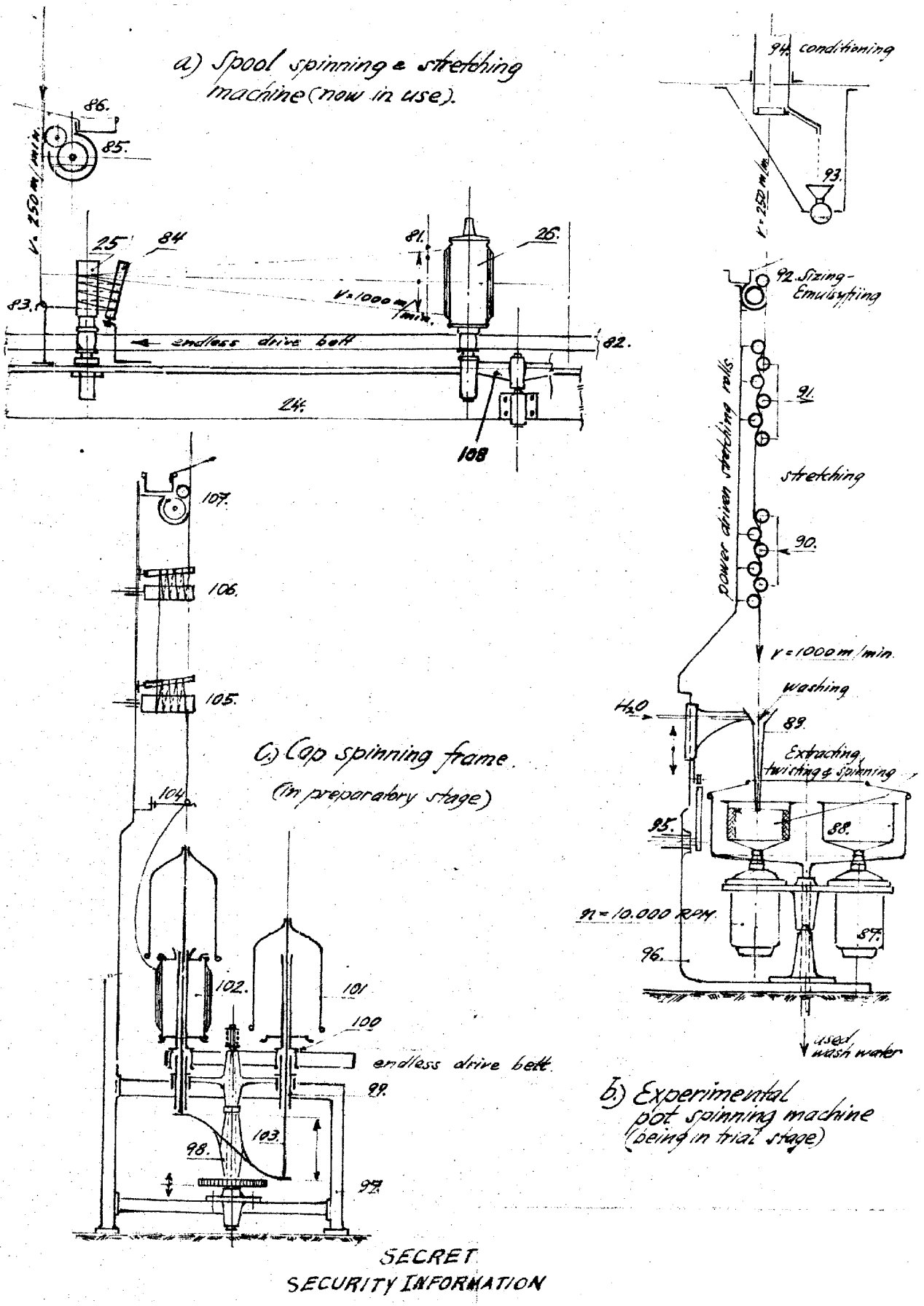


SECRET
SECURITY INFORMATION

SECRET
SECURITY INFORMATION

ENCL. "E"

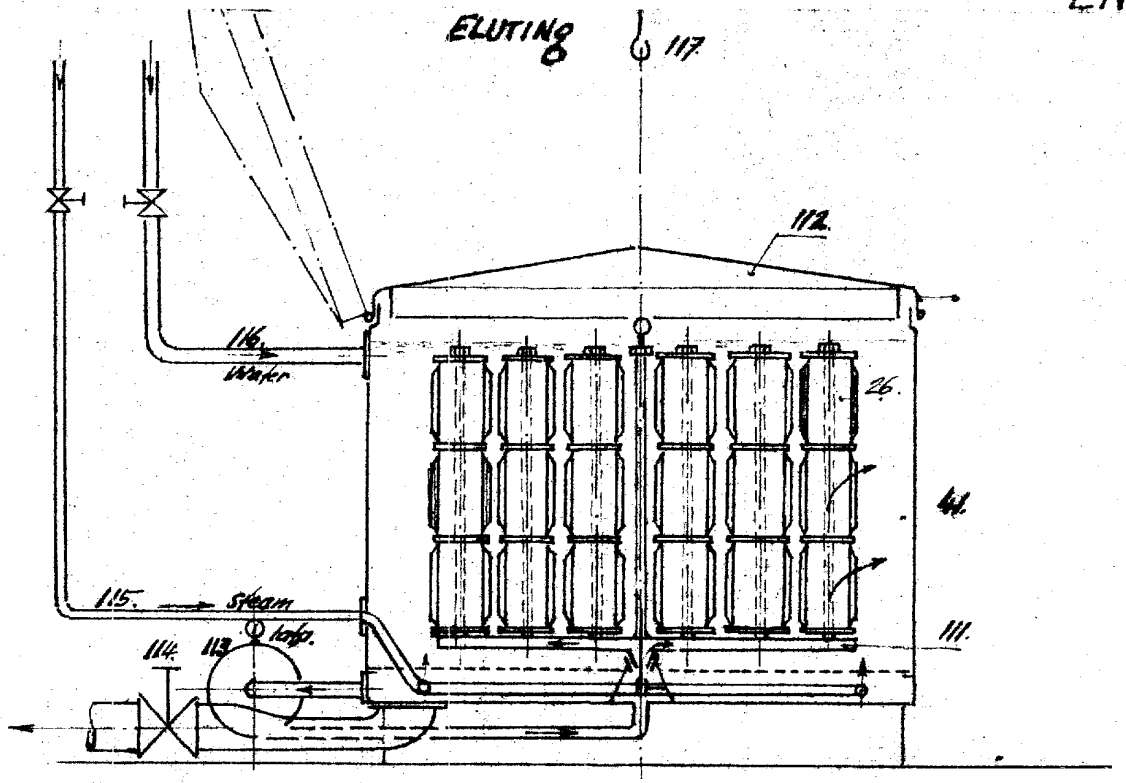
SPINNING AND STRETCHING MACHINERY



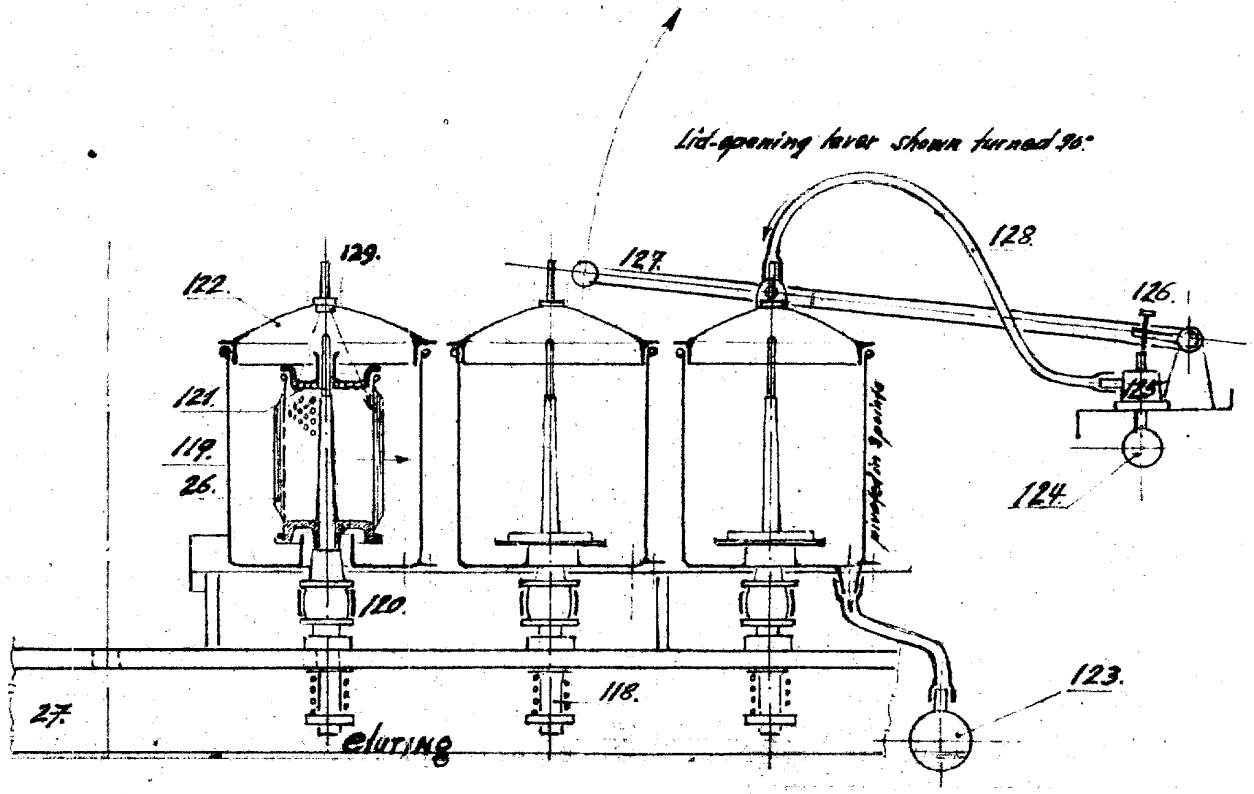
SECRET
SECURITY INFORMATION

ENCL. "F"

HOMOGENEOUS [redacted] MACHINES

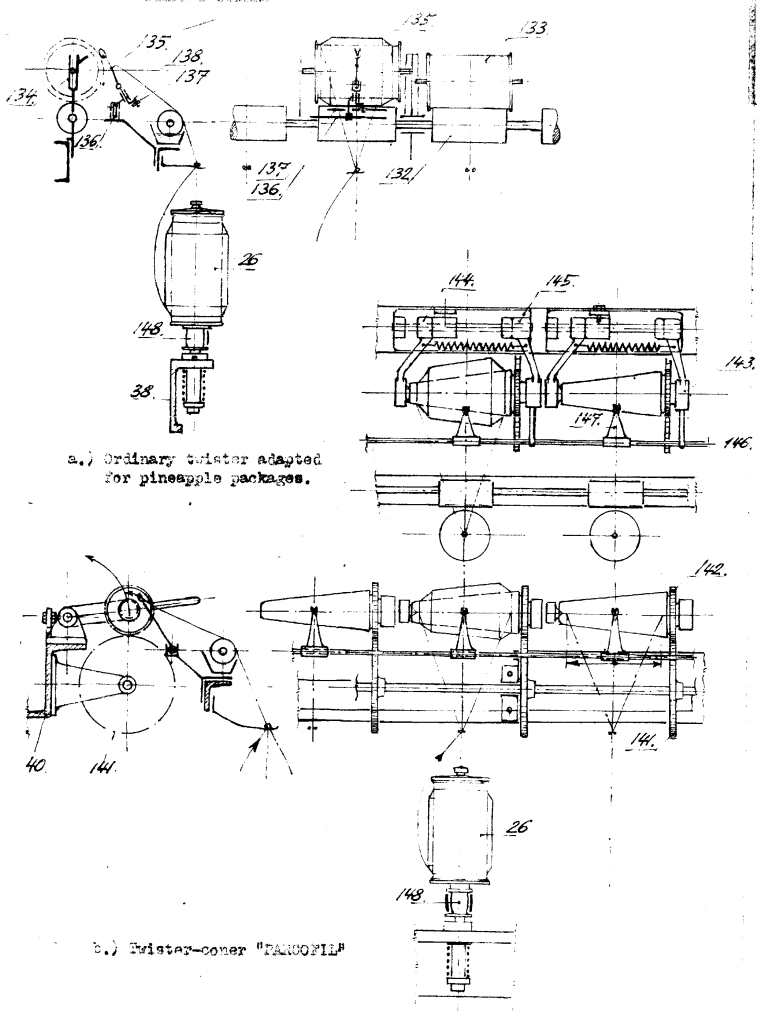


a) Pressure washing machine



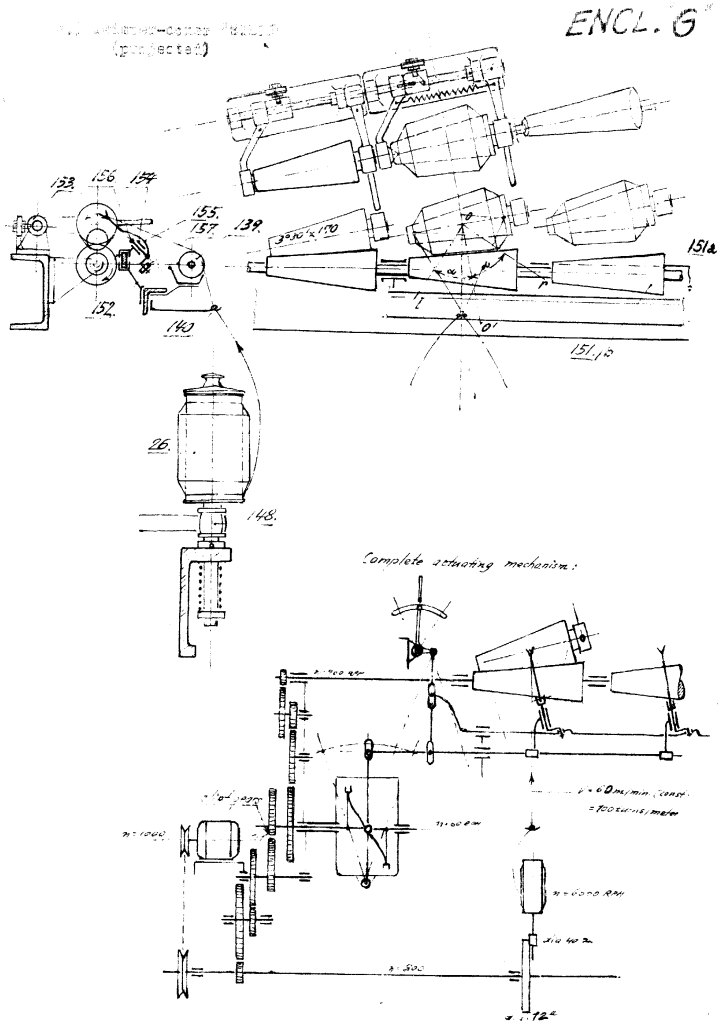
b) Centrifugal [redacted] machine

ENCL. 6



a.) Ordinary twister adapted for pineapple packages.

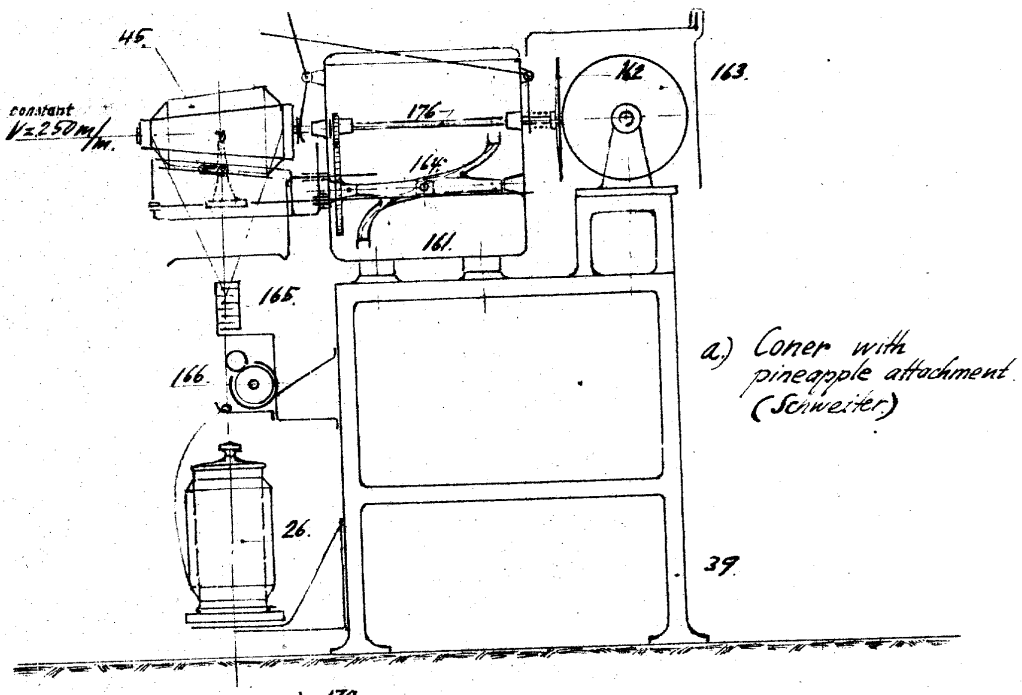
b.) Twister-coner "TAMOFIL"



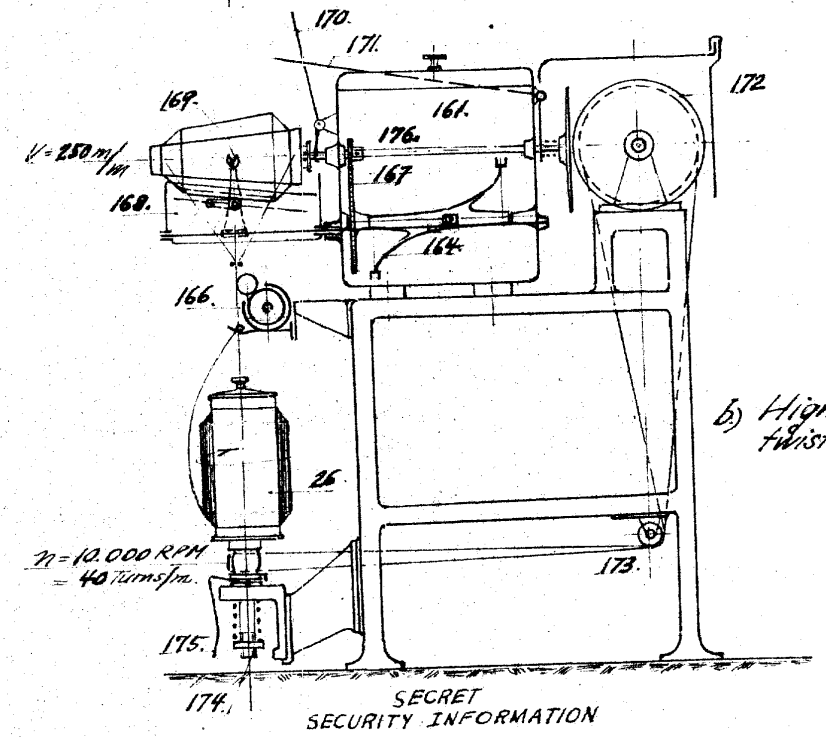
SECRET
SECURITY INFORMATION

ENCL. "H"

SILON CONER AND HIGH-SPEED TWISTER-CONER



a.) Coner with pineapple attachment (Schweiter)



b.) High-speed twister-coner.

SECRET
SECURITY INFORMATION

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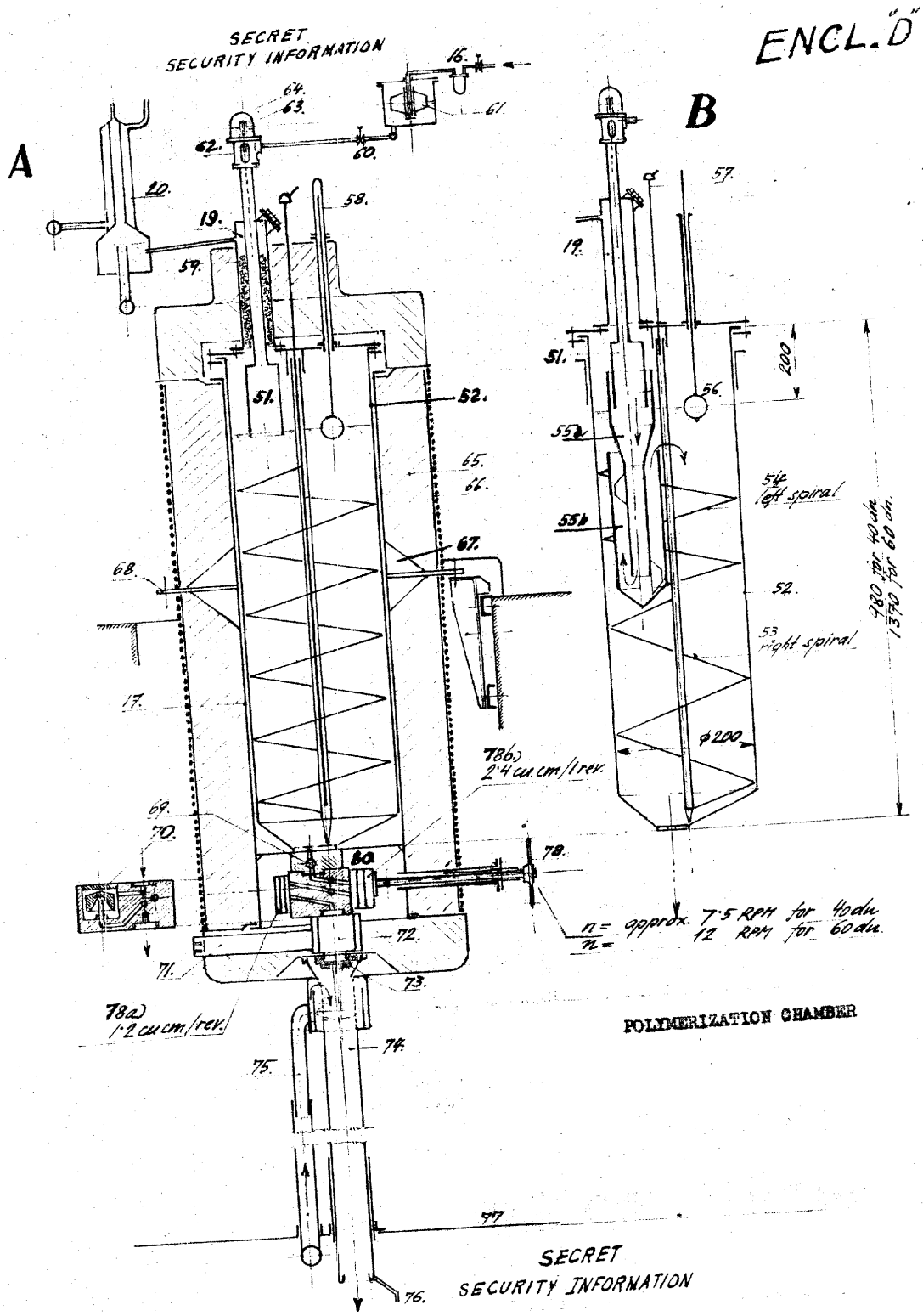
SECURITY INFORMATION

ENCL. "D"



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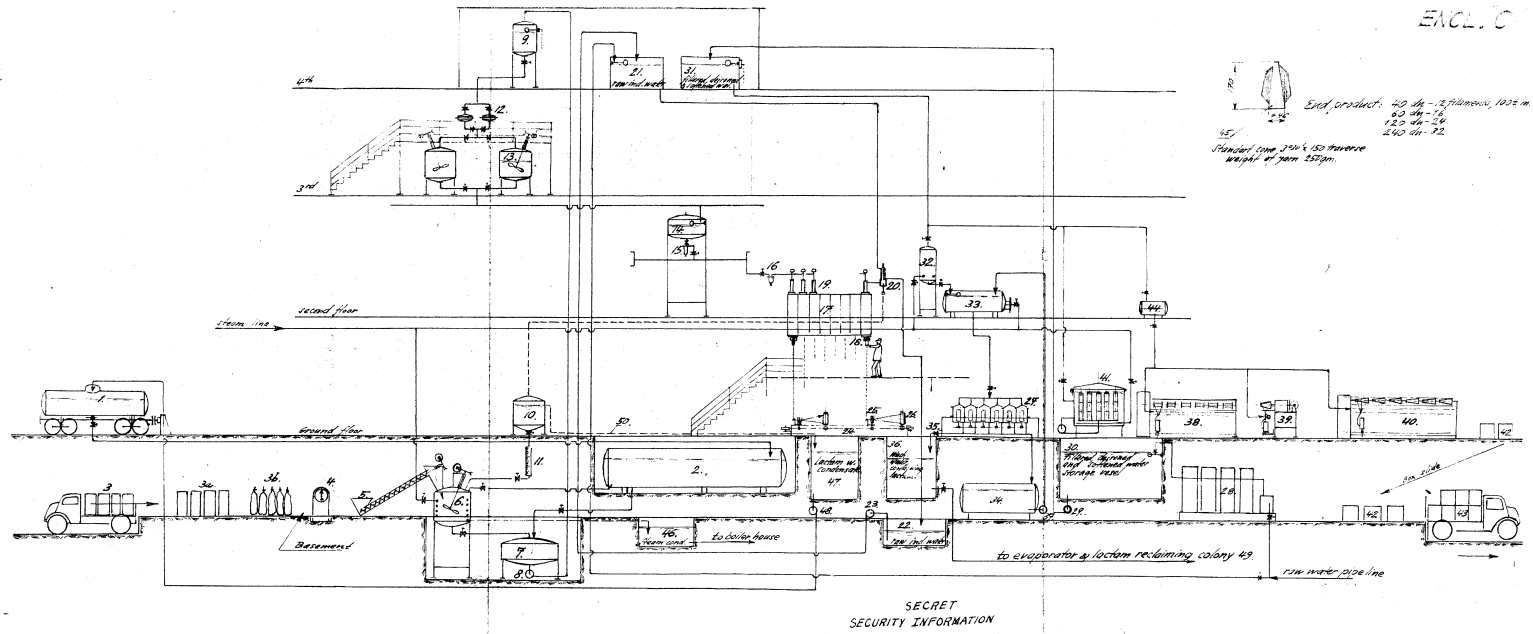
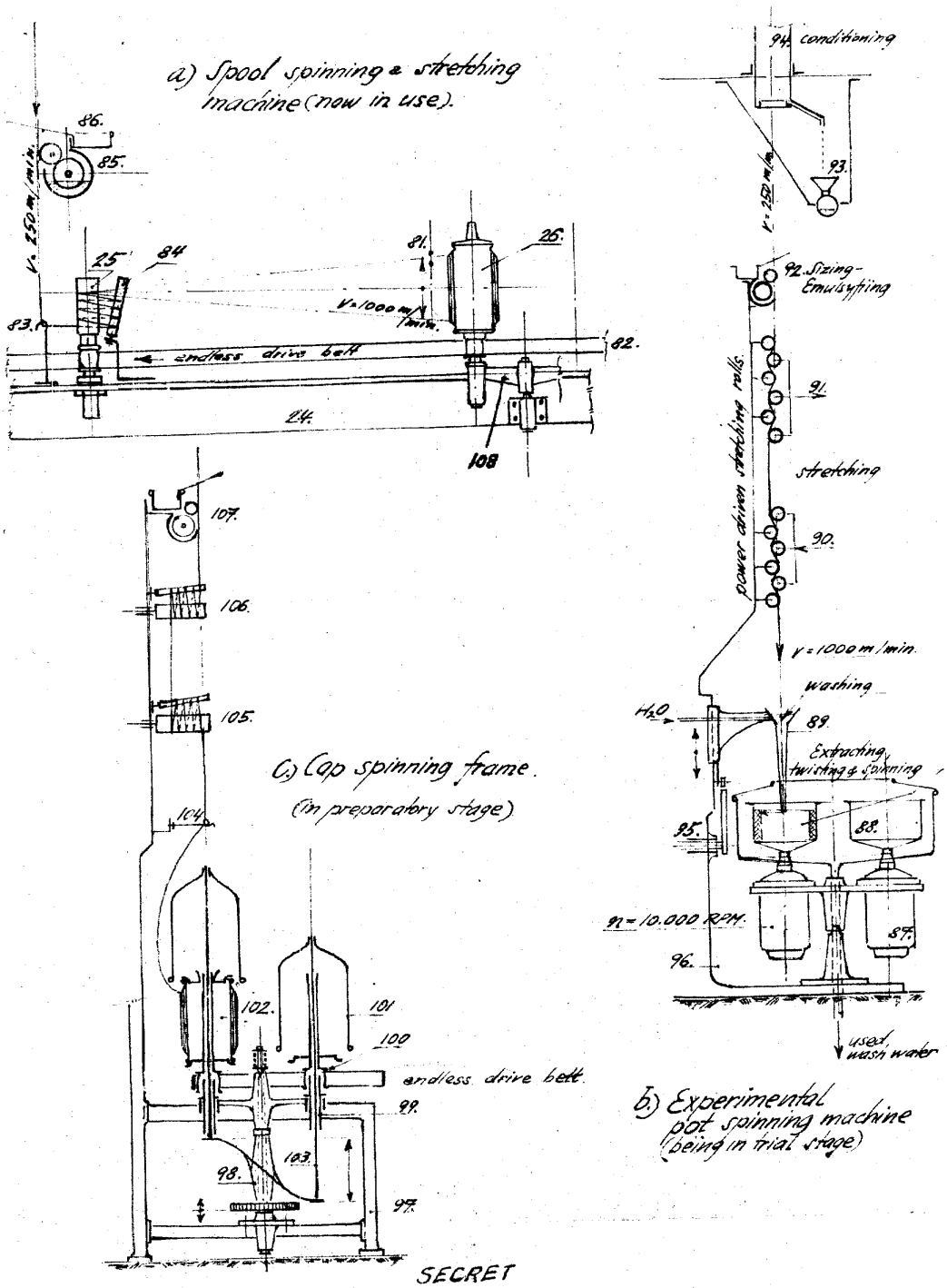
ENCL. C



ENCL. "E"

SPINNING AND STRETCHING MACHINERY



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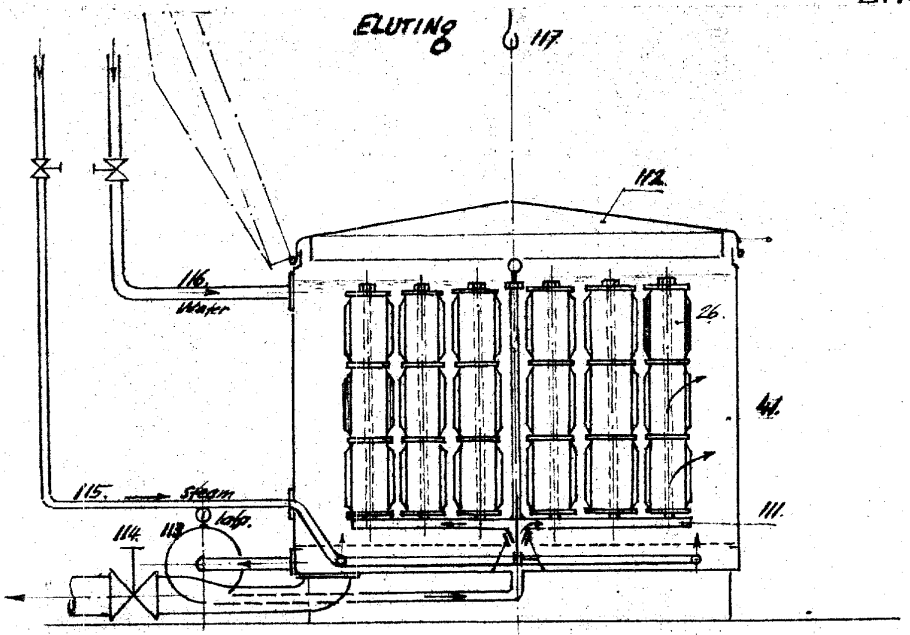
SECURITY INFORMATION

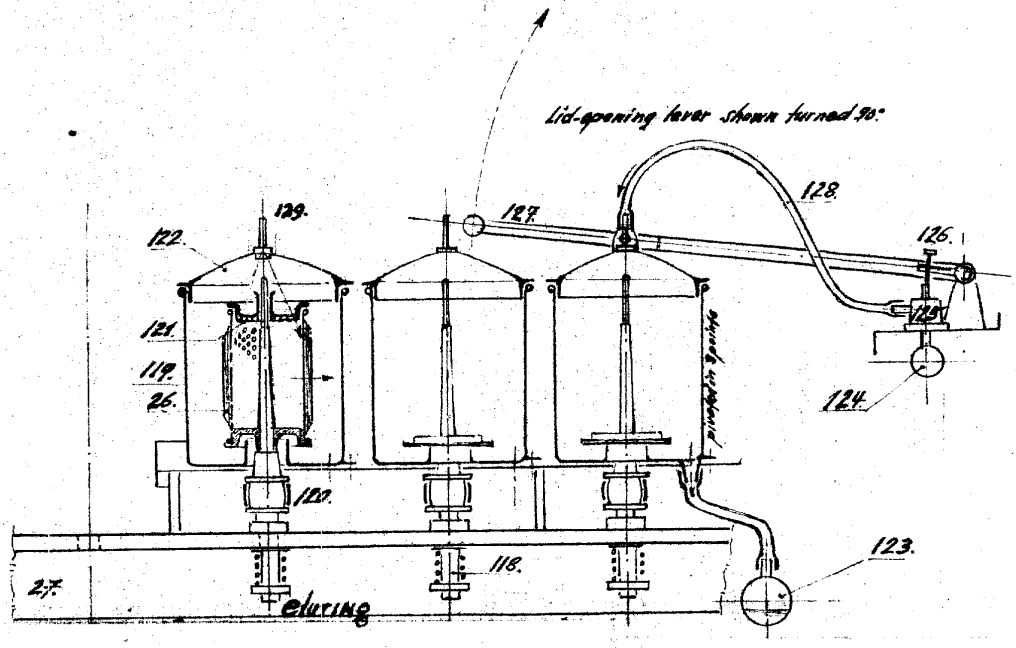
SECURITY INFORMATION

MONOMER [redacted] MACHINES

ENCL. "F"



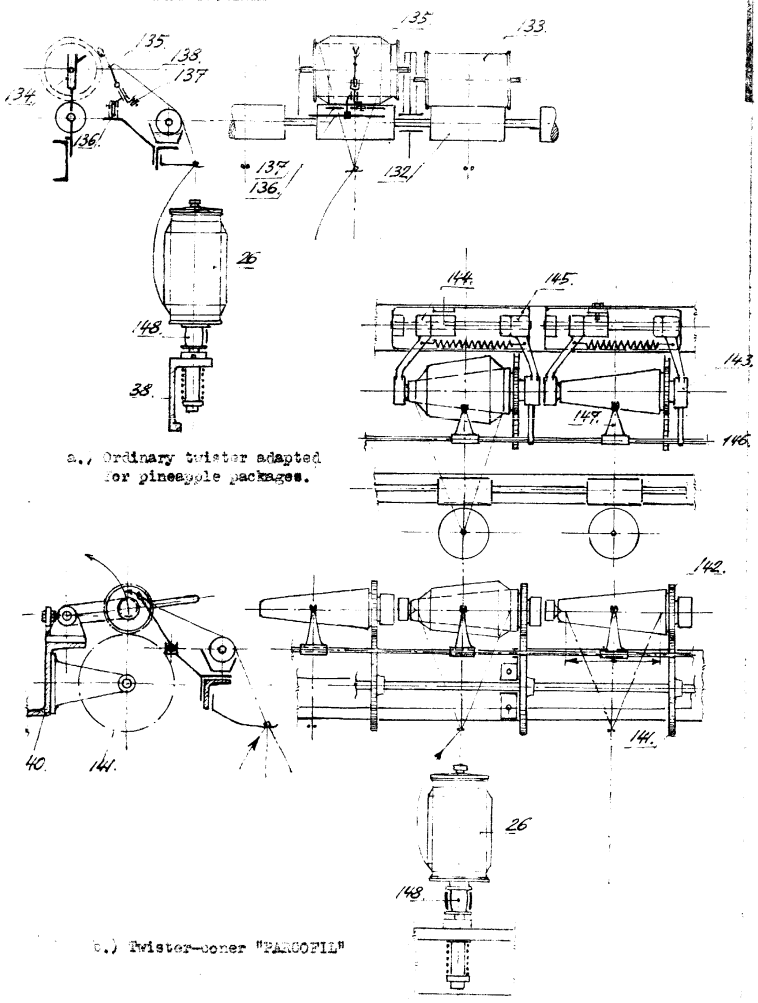
a) Pressure washing machine



b) Centrifugal [redacted] machine

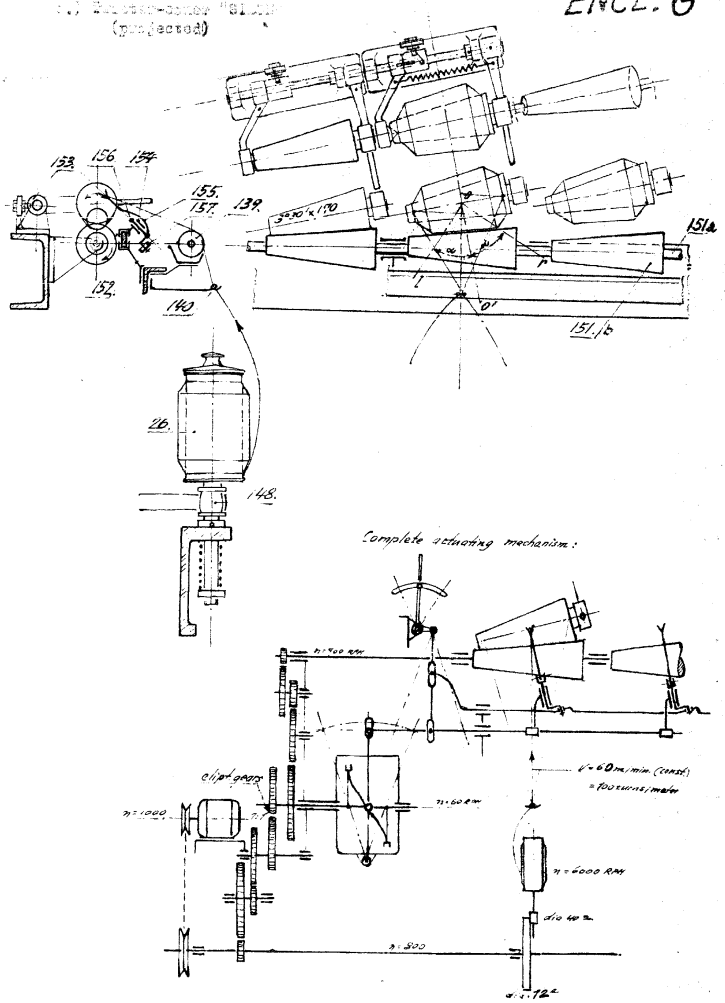
SECRET
SECURITY INFORMATION

ENCL. "G"



a.) Ordinary twister adapted for pineapple packages.

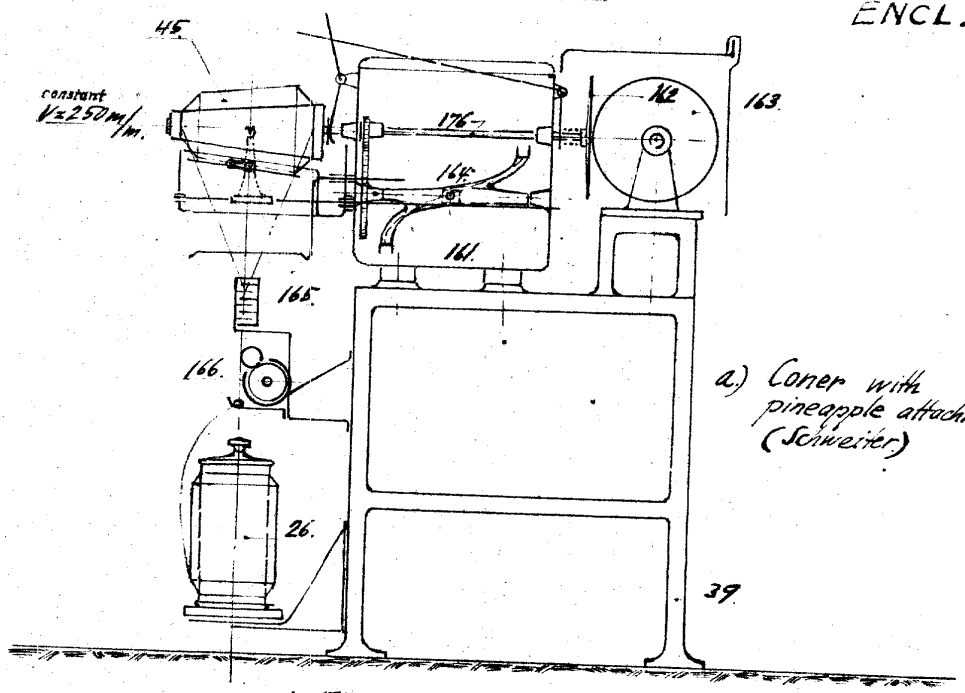
b.) Twister-coner "PARCOFIL"



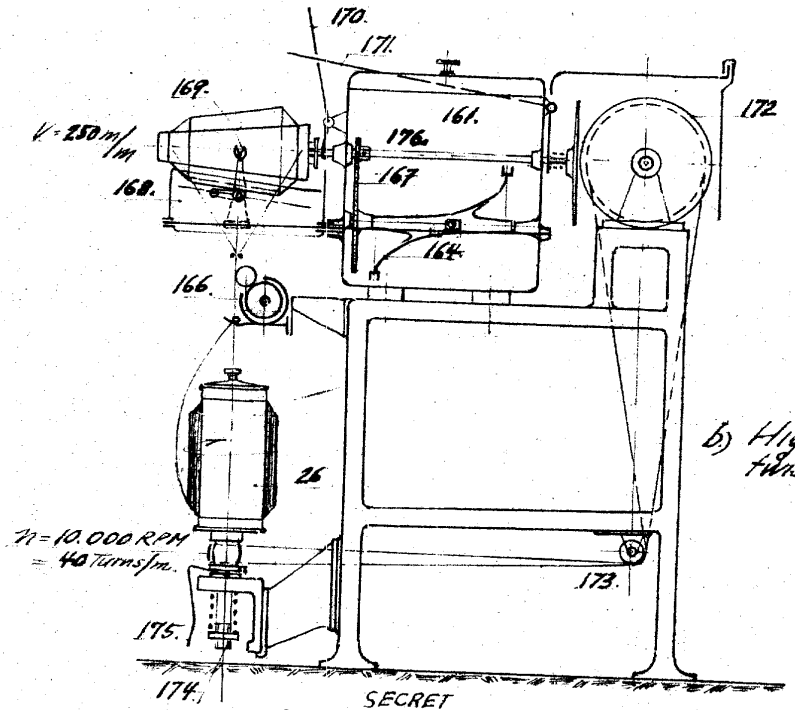
SECRET
SECURITY INFOMATION

SILON CONER AND HIGH-SPEED TWISTER-CONER

ENCL. "H"



a) Coner with pineapple attachment (Schweiter)



b) High-speed twister-coner.

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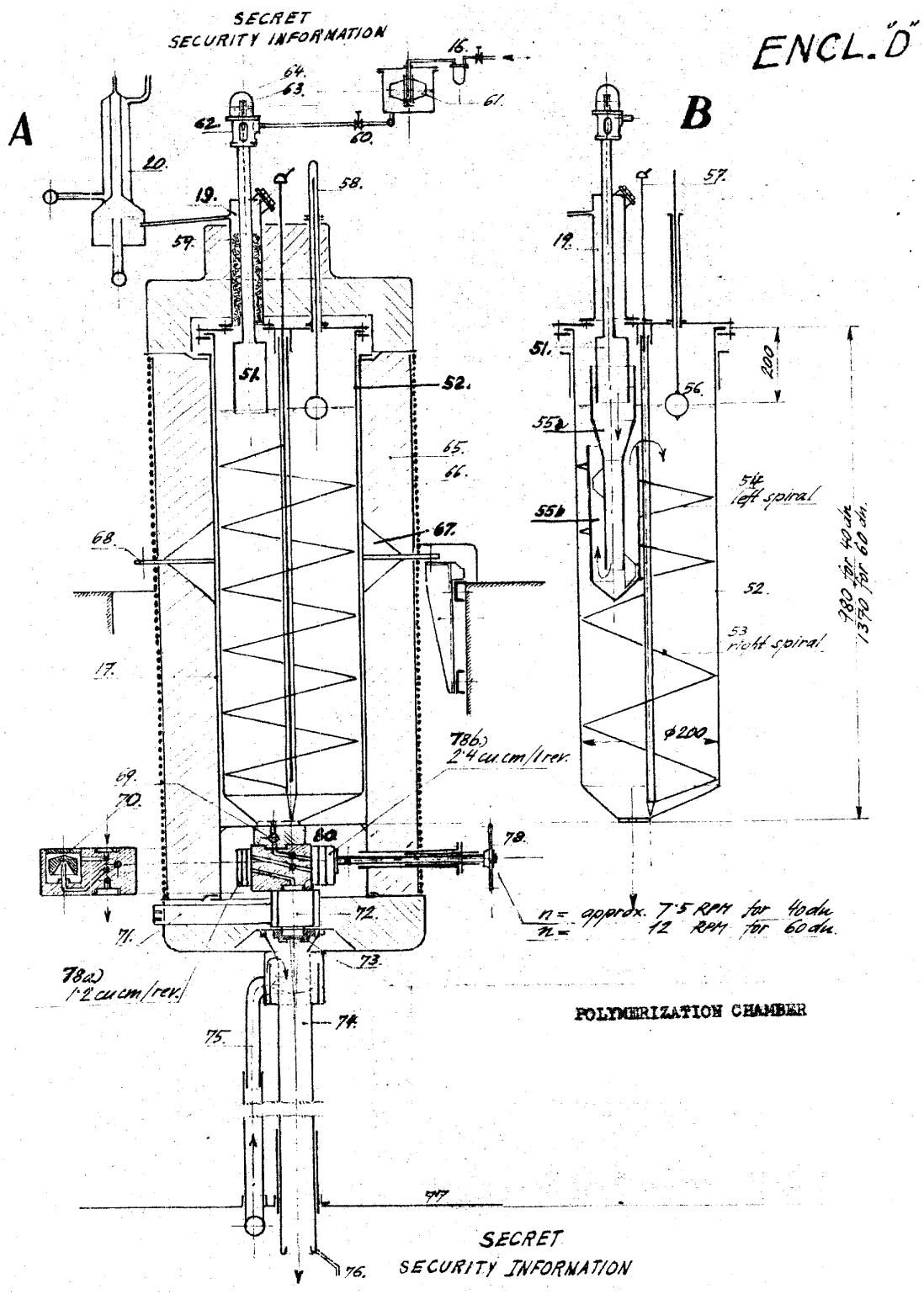
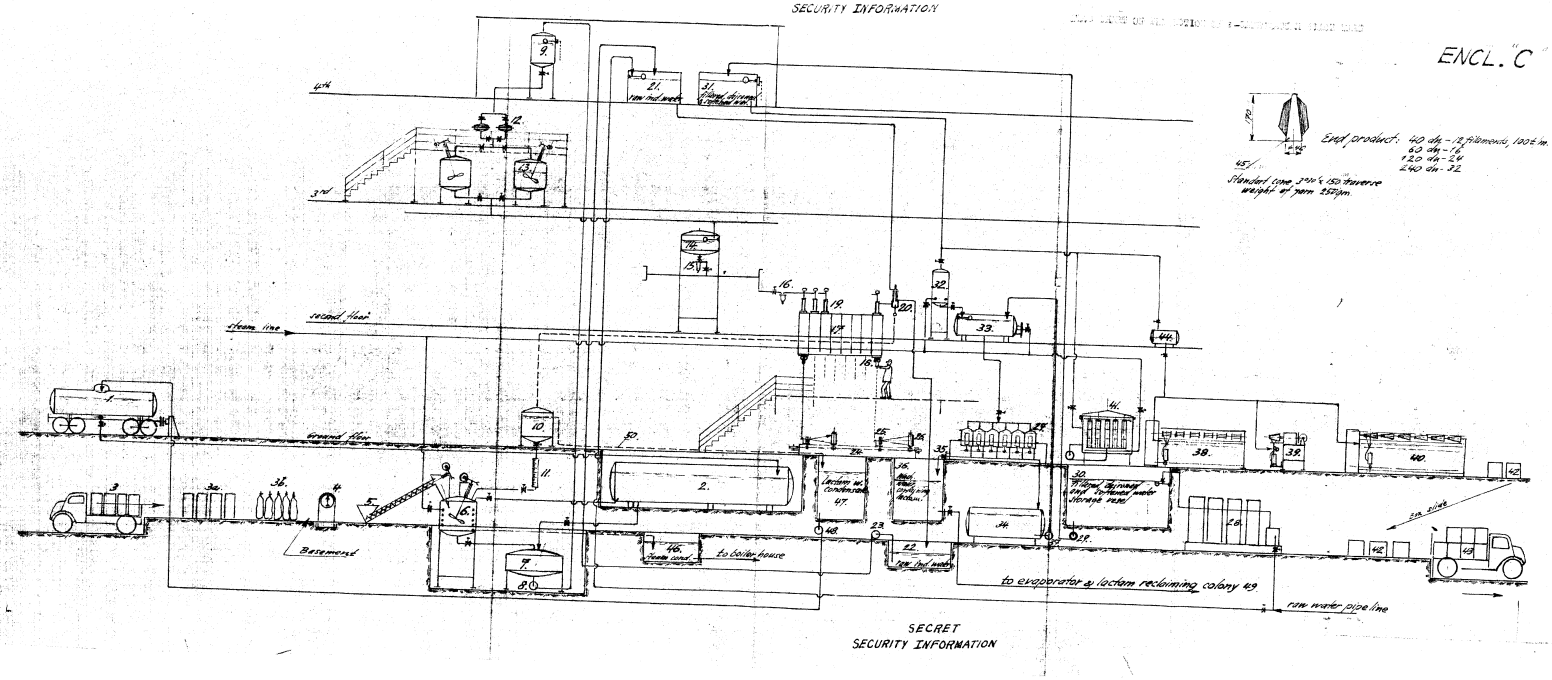
SECURITY INFORMATION



SECURITY INFORMATION

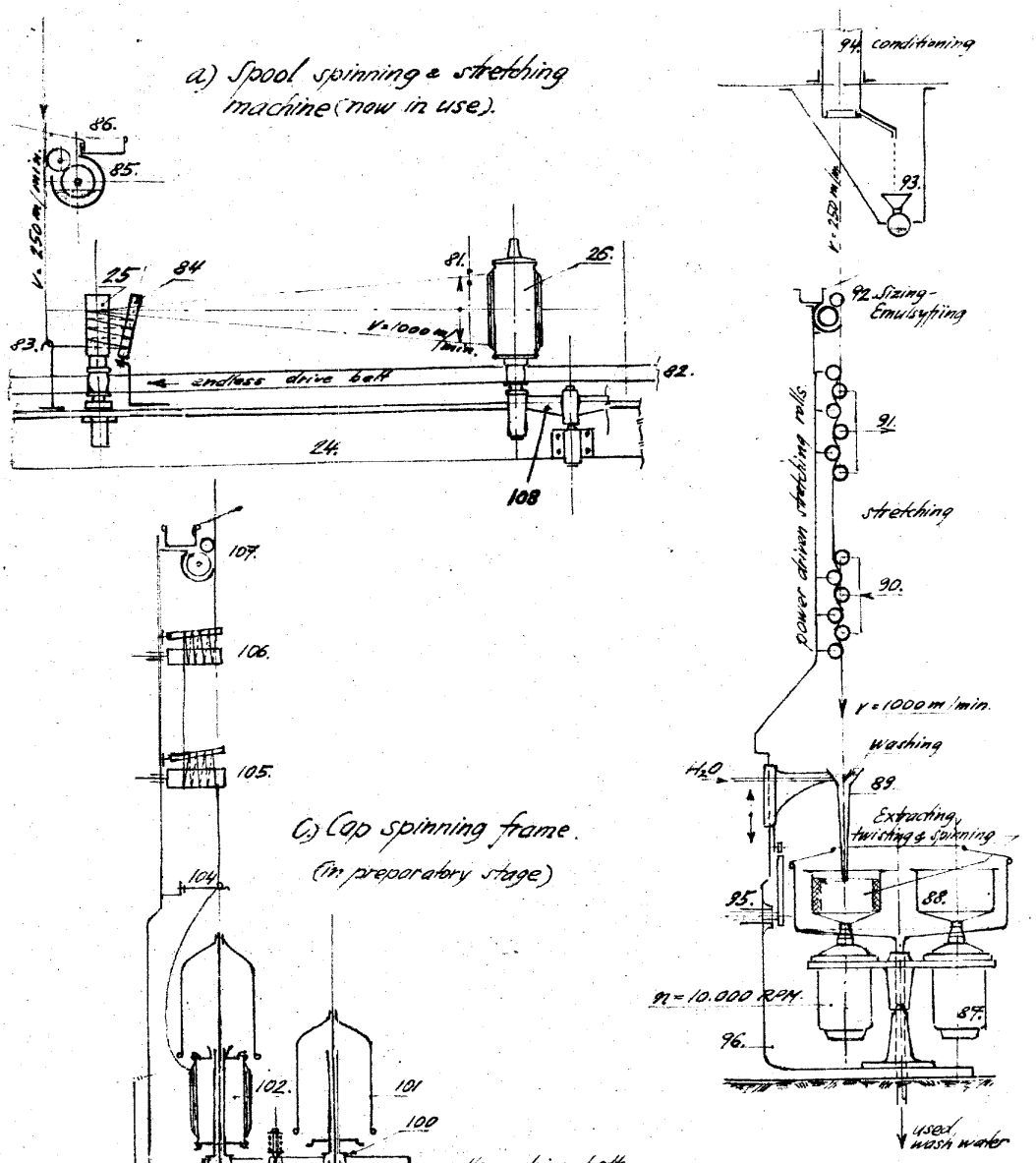
ENCL. "C"



SECRET
SECURITY INFORMATION

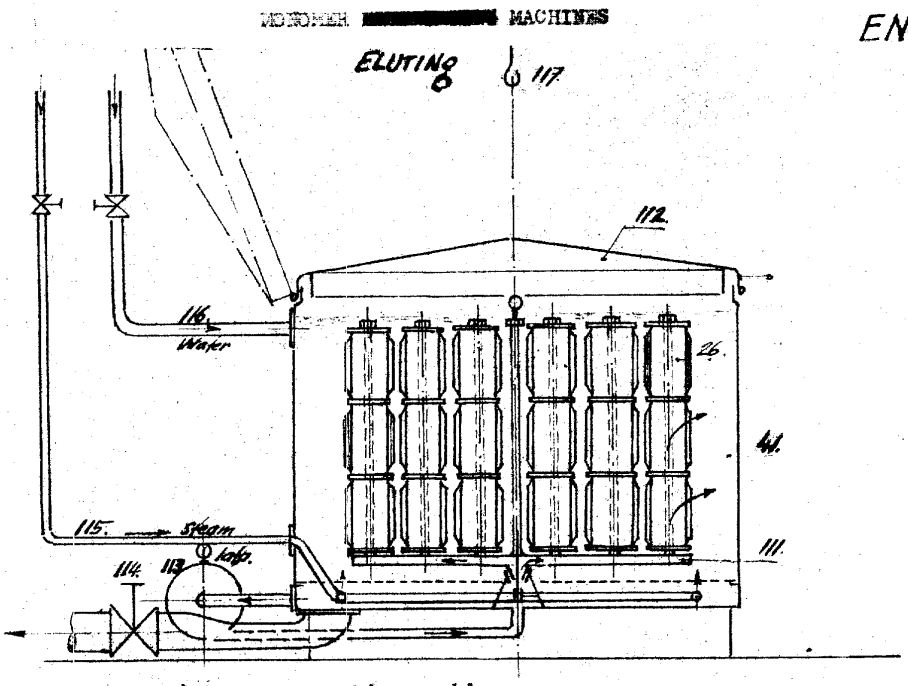
ENCL. "E"

SPINNING AND STRETCHING MACHINERY

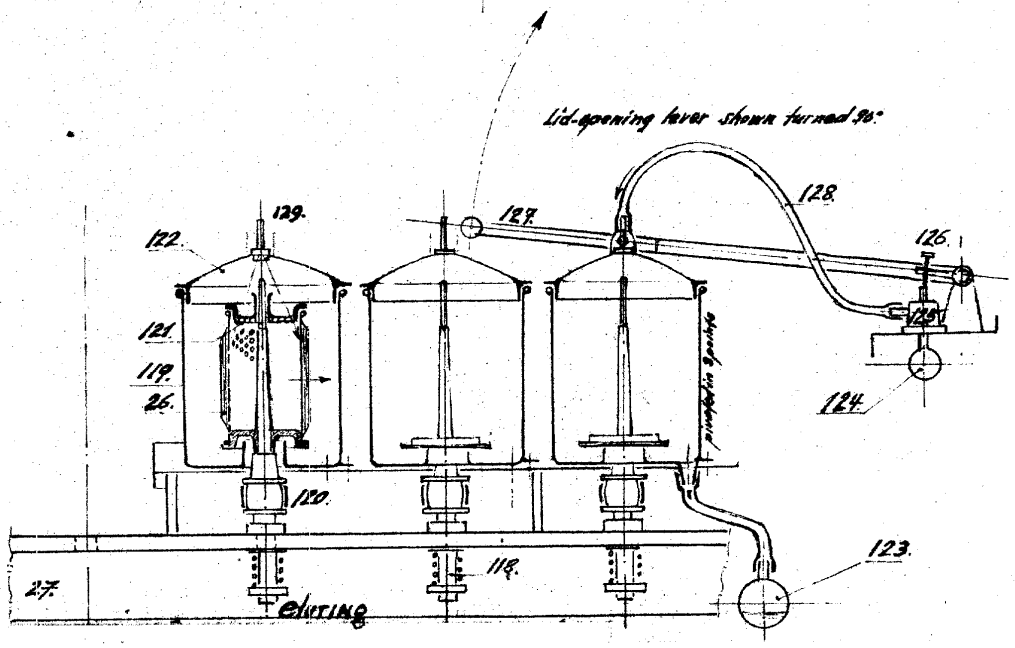


SECRET
SECURITY INFORMATION

ENCL. "F"



a) Pressure washing machine

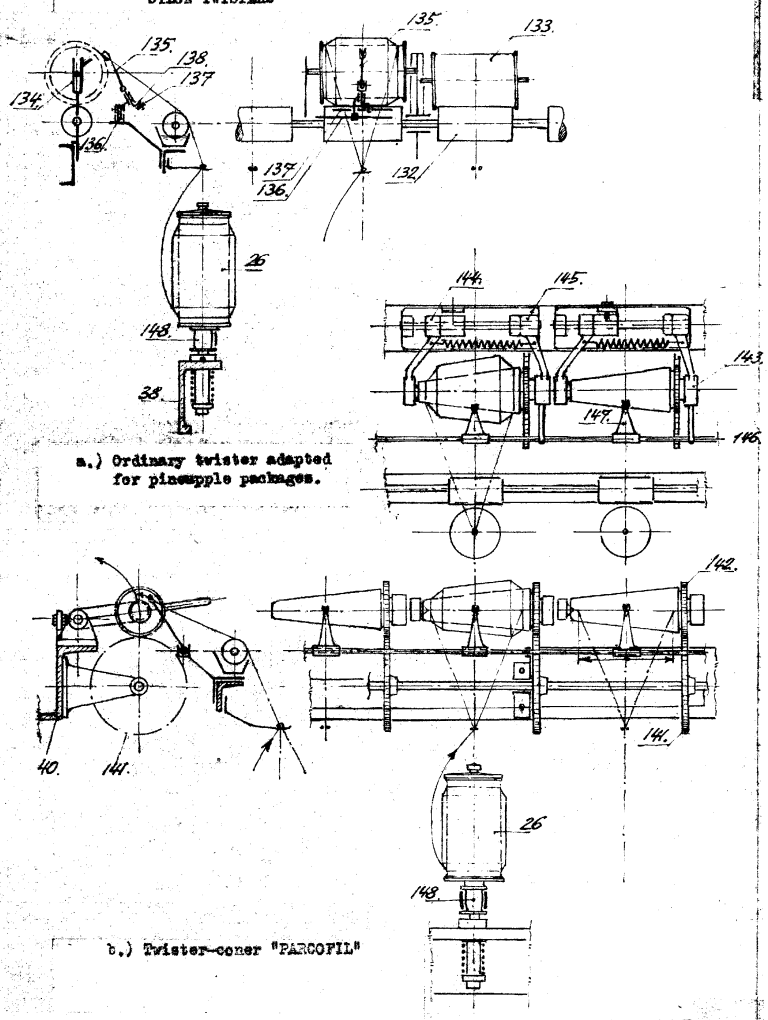


b) Centrifugal [redacted] machine

SECRET
SECURITY INFORMATION

ENCL. "G"

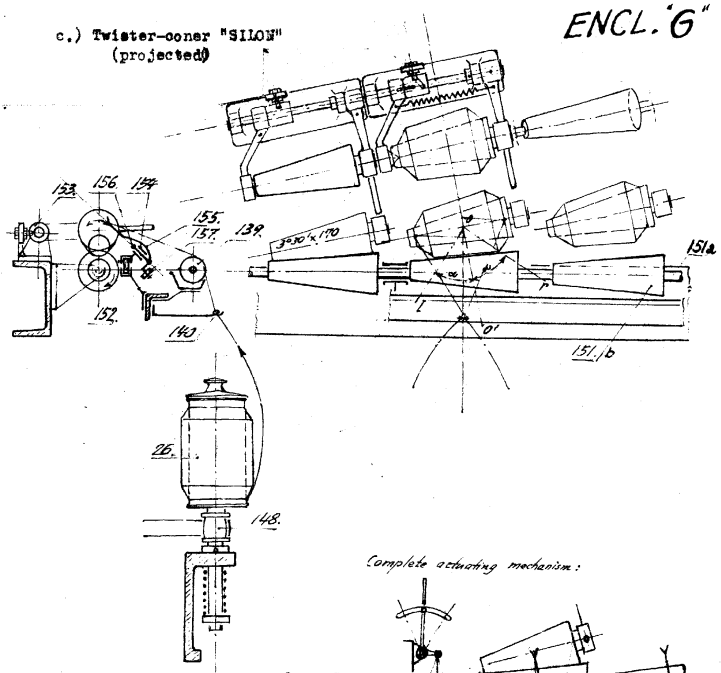
SILON TWISTERS



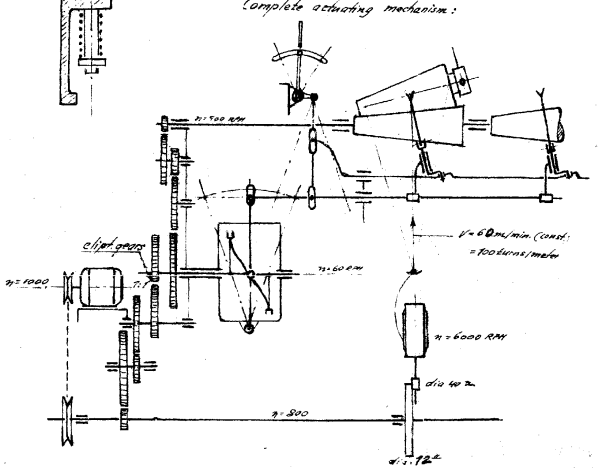
a.) Ordinary twister adapted for pineapple packages.

b.) Twister-coner "FARCOFIL"

c.) Twister-coner "SILON" (projected)



Complete actuating mechanism:



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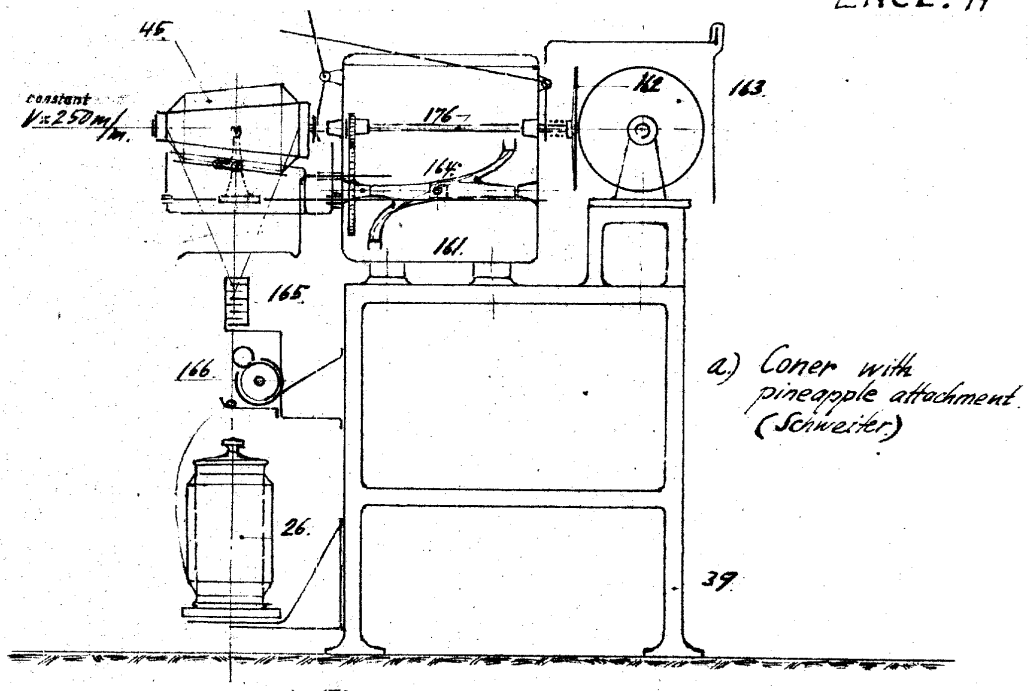
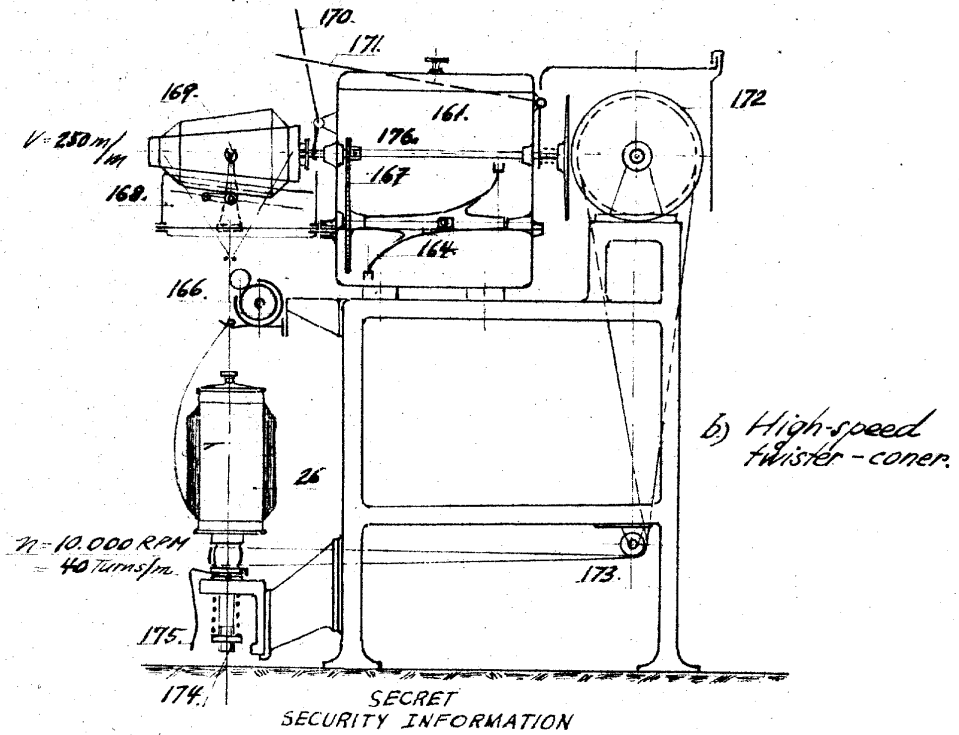
SILON CONER AND HIGH-SPEED TWISTER-CONER

ENCL. "H"



a) Coner with pineapple attachment (Schweiter)



b) High-speed twister-coner.

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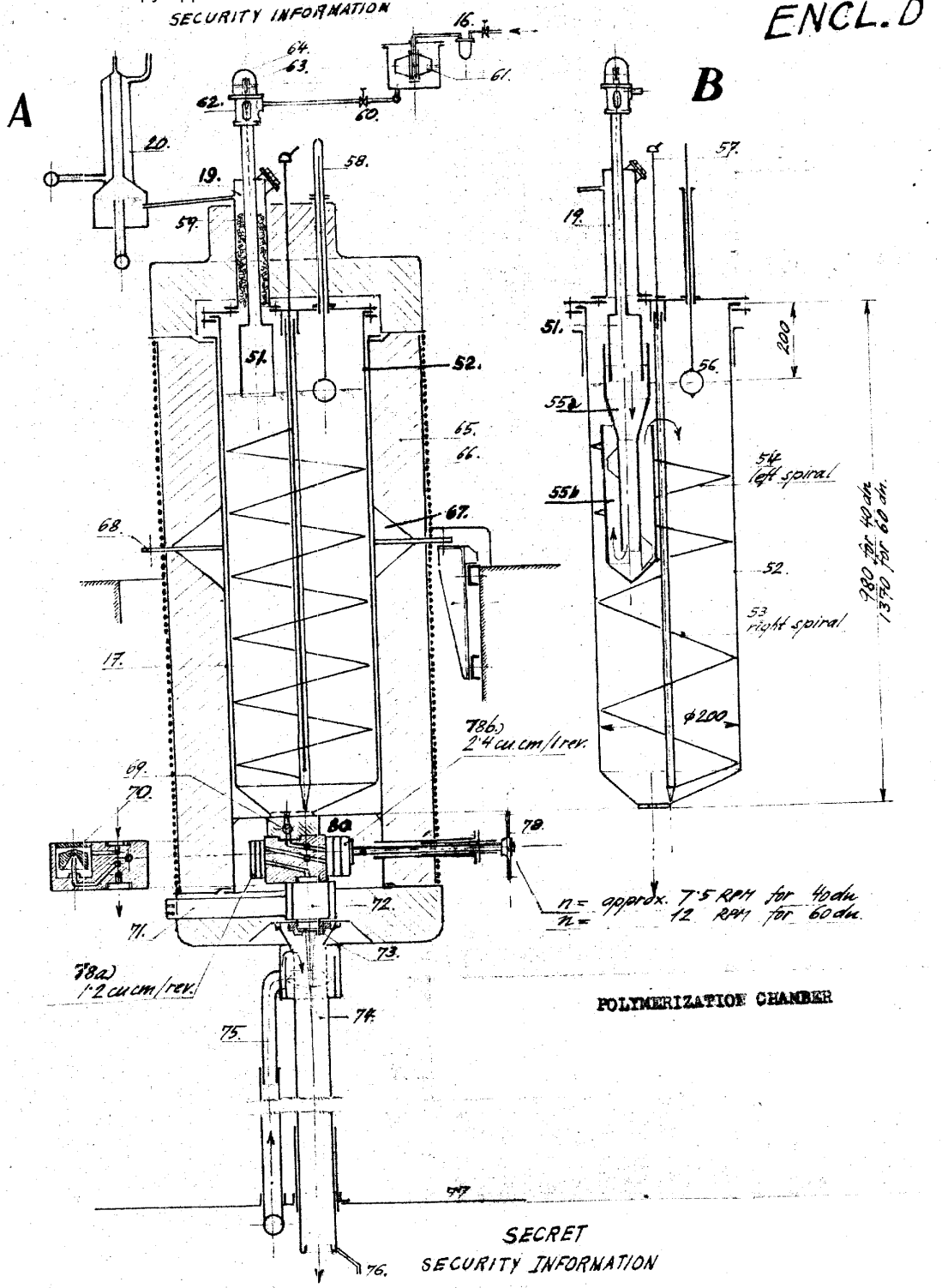
SECURITY INFORMATION

SECURITY INFORMATION

ENCL. "D"



POLYMERIZATION CHAMBER

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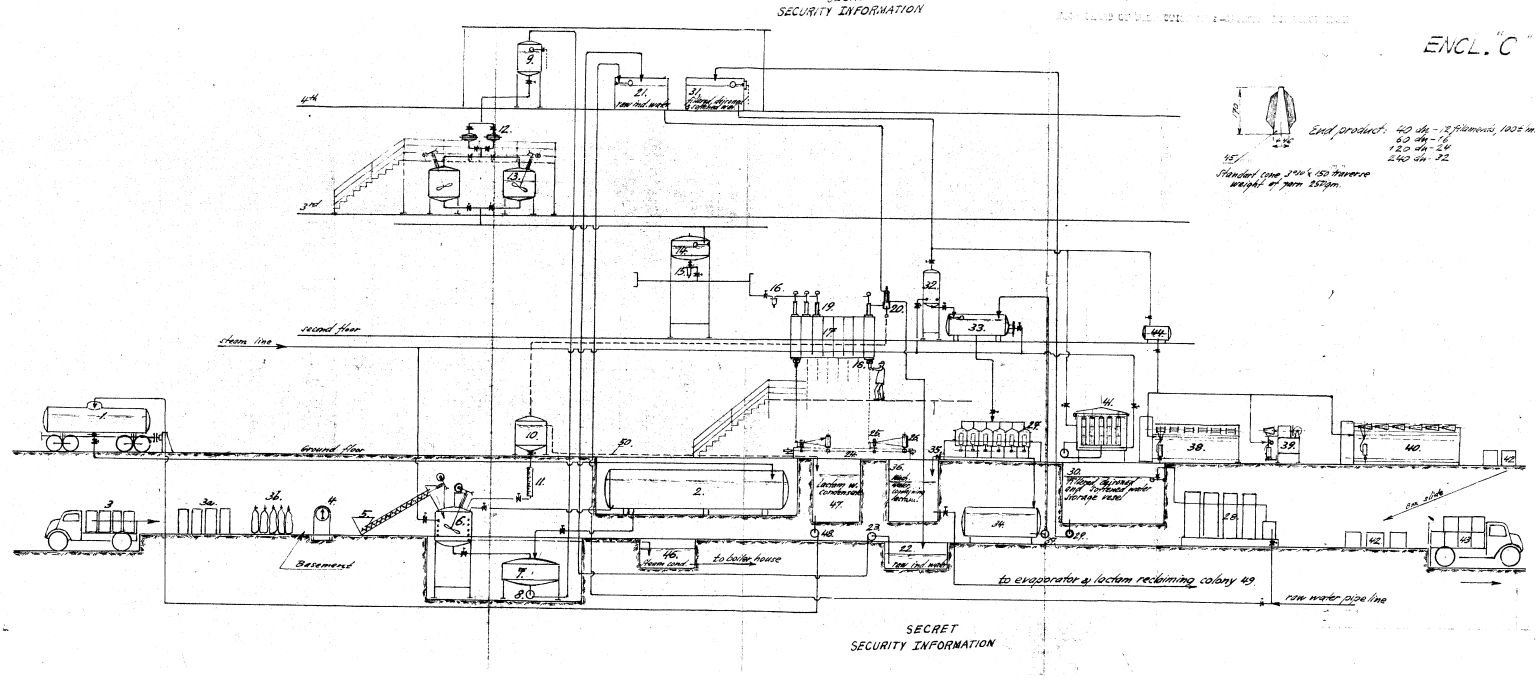
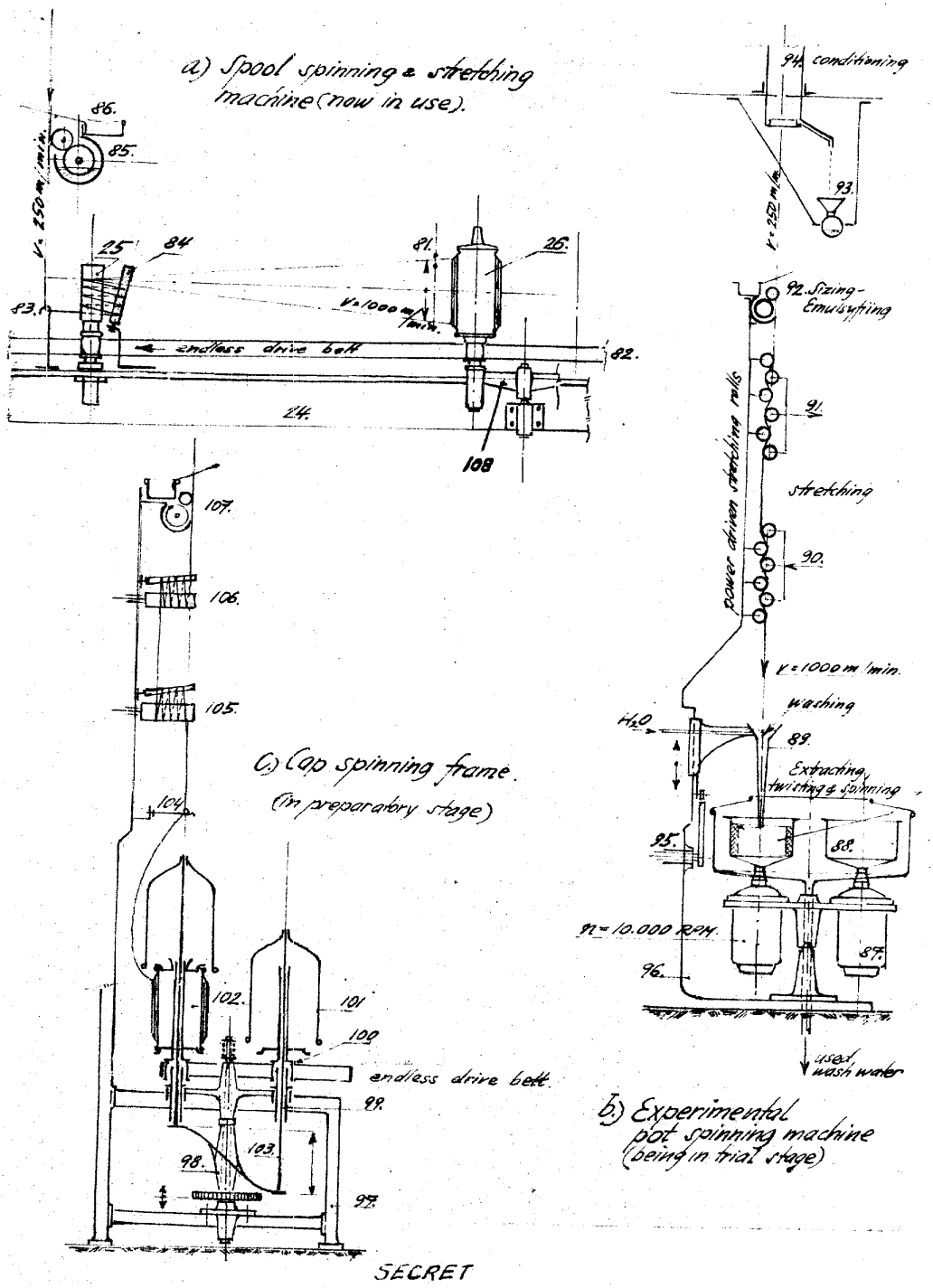
ENCL. "C"



ENCL. "E"

SPINNING AND STRETCHING MACHINERY



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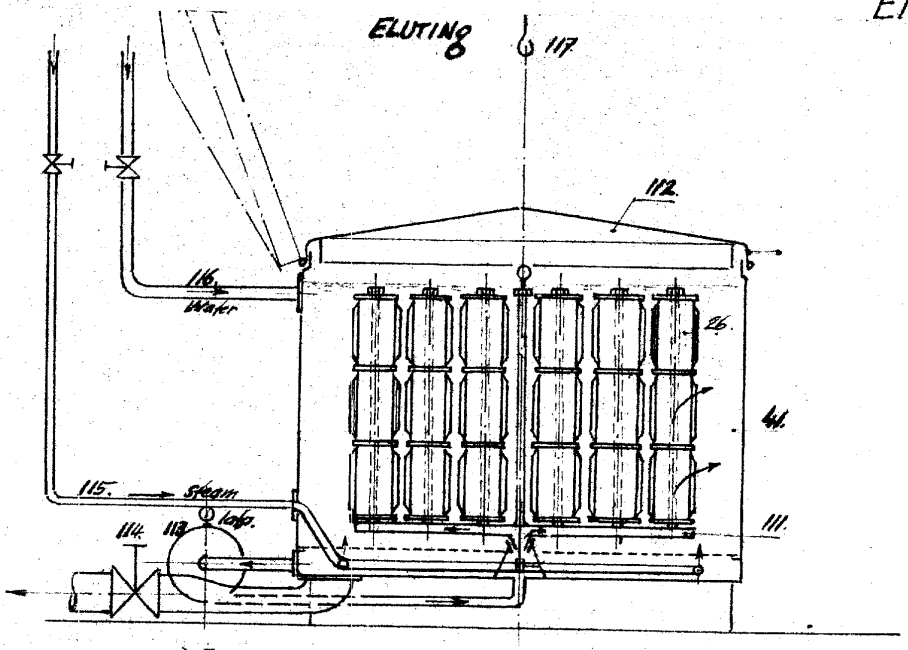
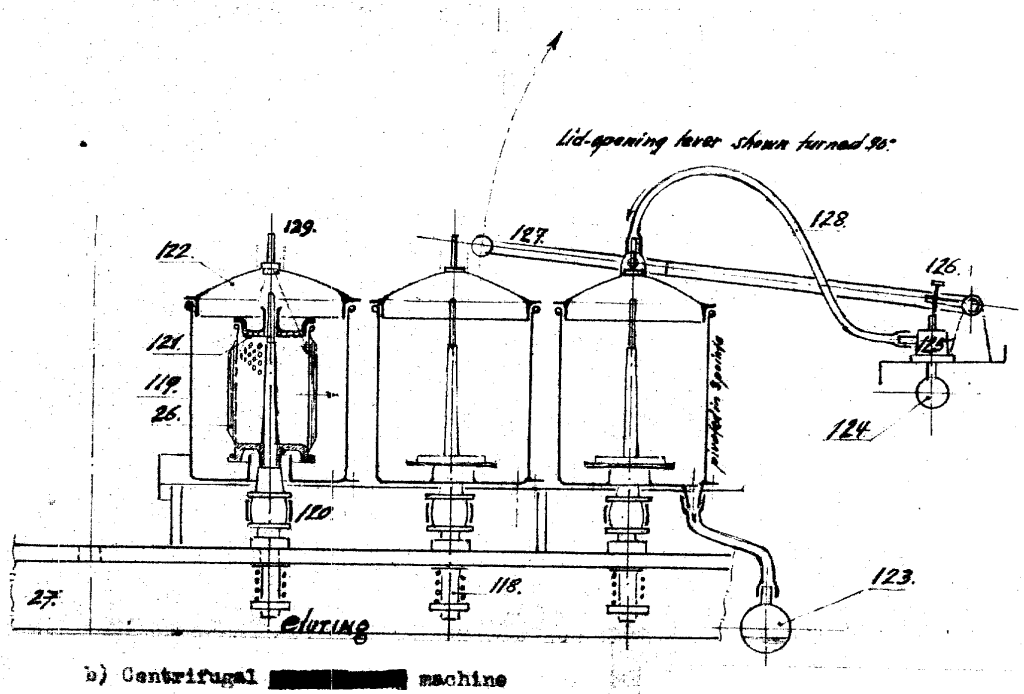
SECURITY INFORMATION

ENCL. "F"

[redacted] MACHINES



a) Pressure washing machine



b) Centrifugal [redacted] machine

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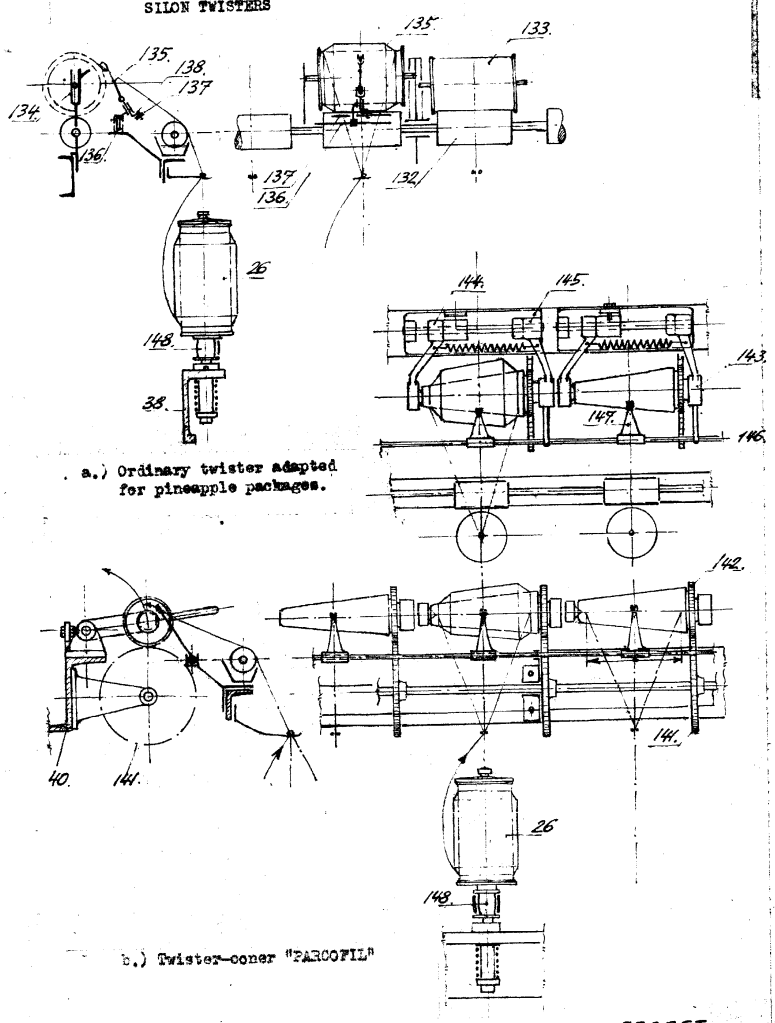
SECURITY INFORMATION

ENCL. "6"

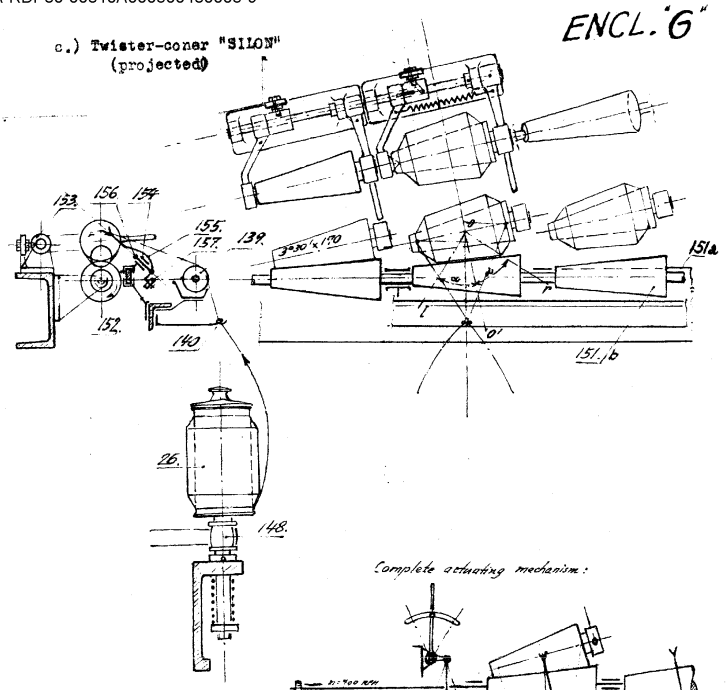
SILON TWISTERS



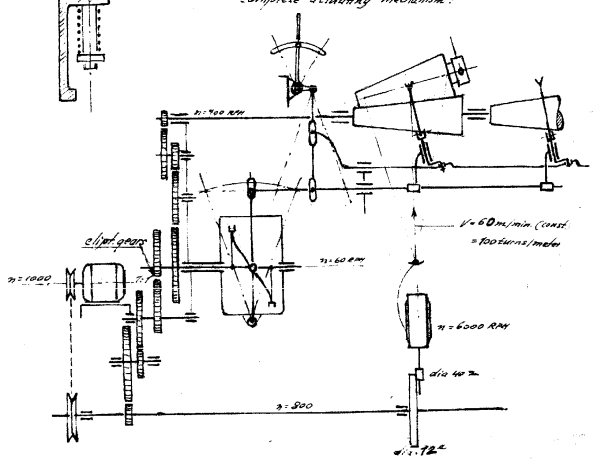
a.) Ordinary twister adapted for pineapple packages.

b.) Twister-coner "FARCOFIL"

c.) Twister-coner "SILON" (projected)



Complete actuating mechanism:



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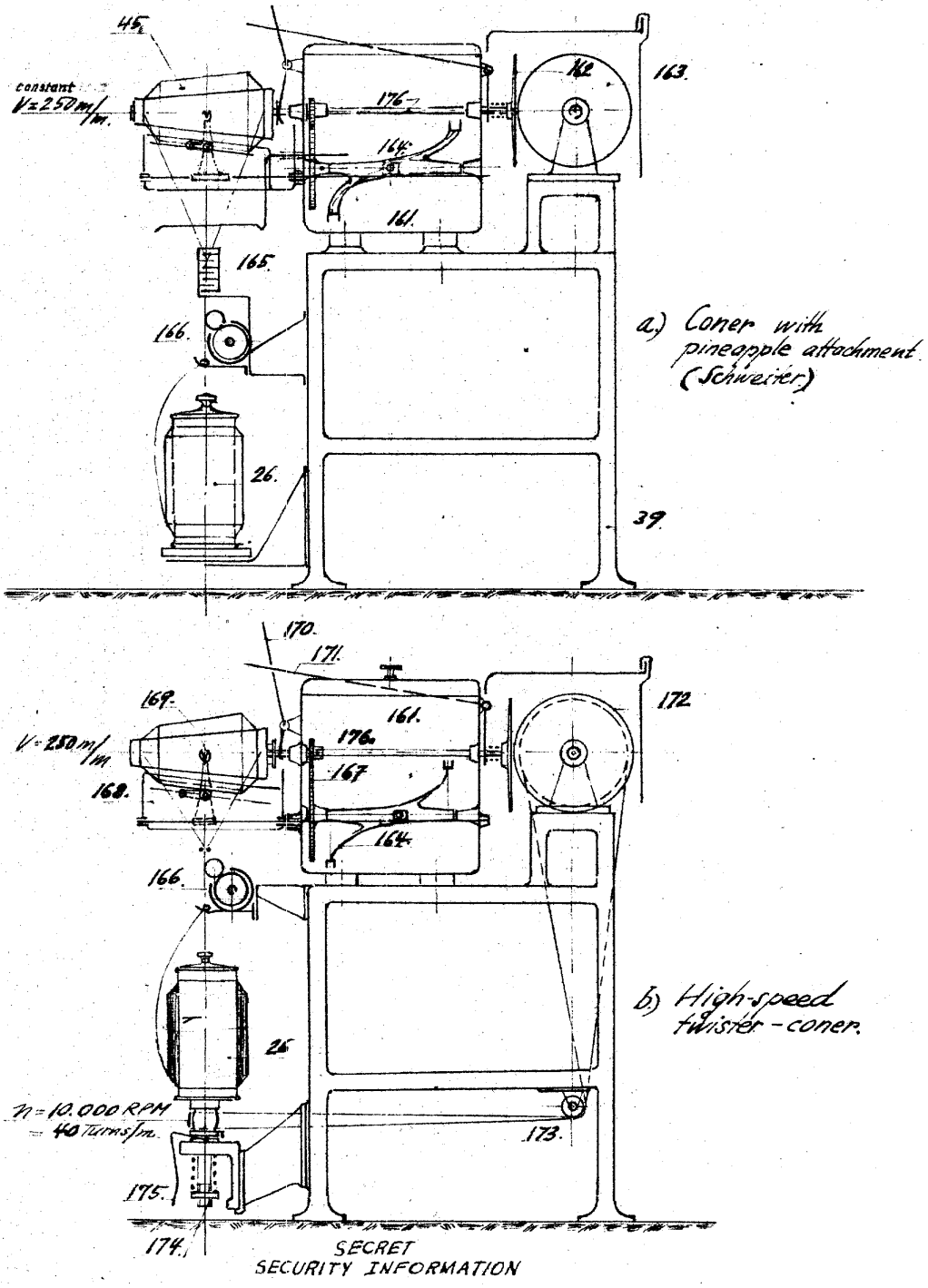
SECURITY INFORMATION

SILON CONER AND HIGH-SPEED TWISTER-CONER

ENCL. "H"



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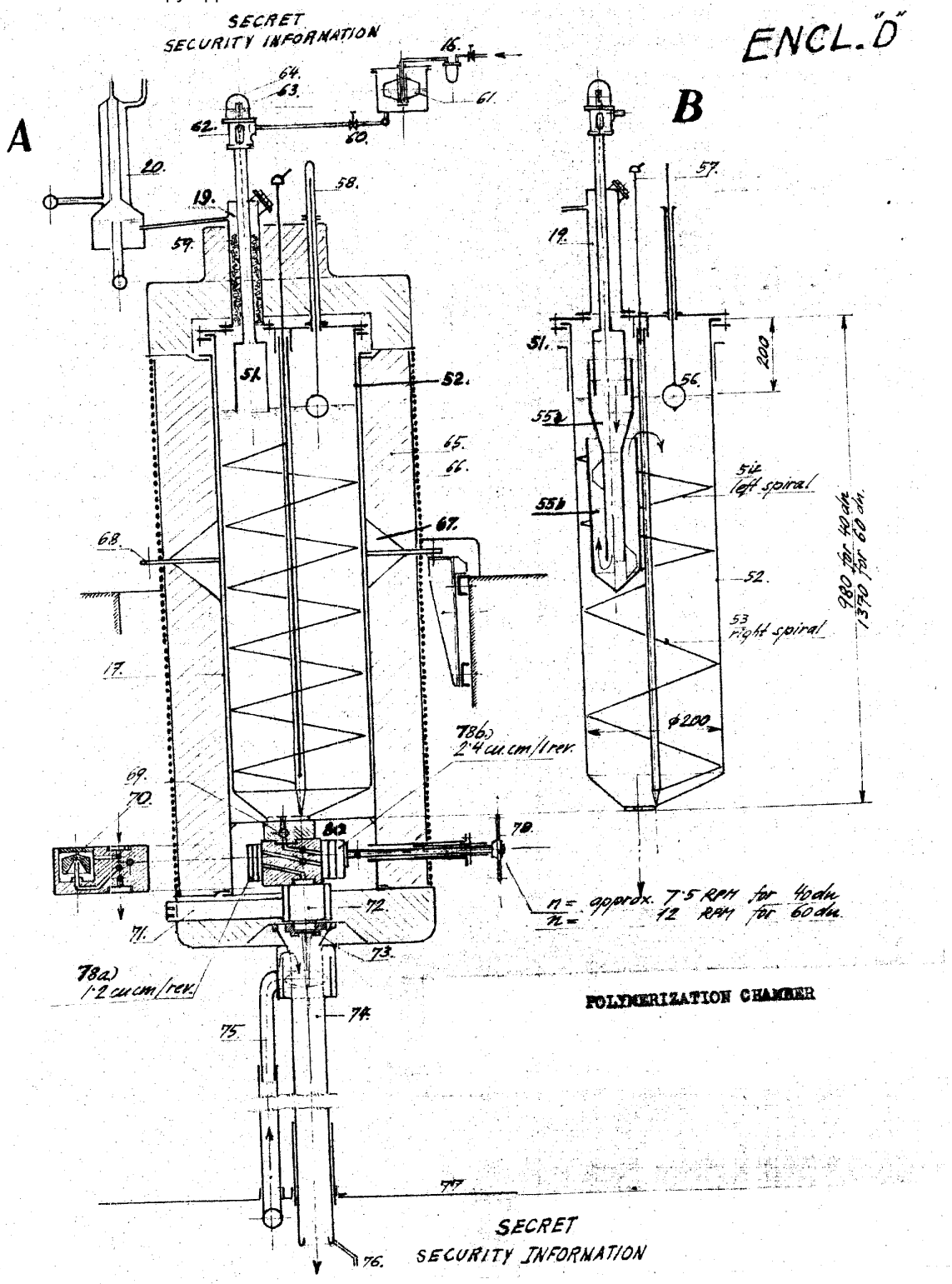
SECURITY INFORMATION

ENCL. "D"



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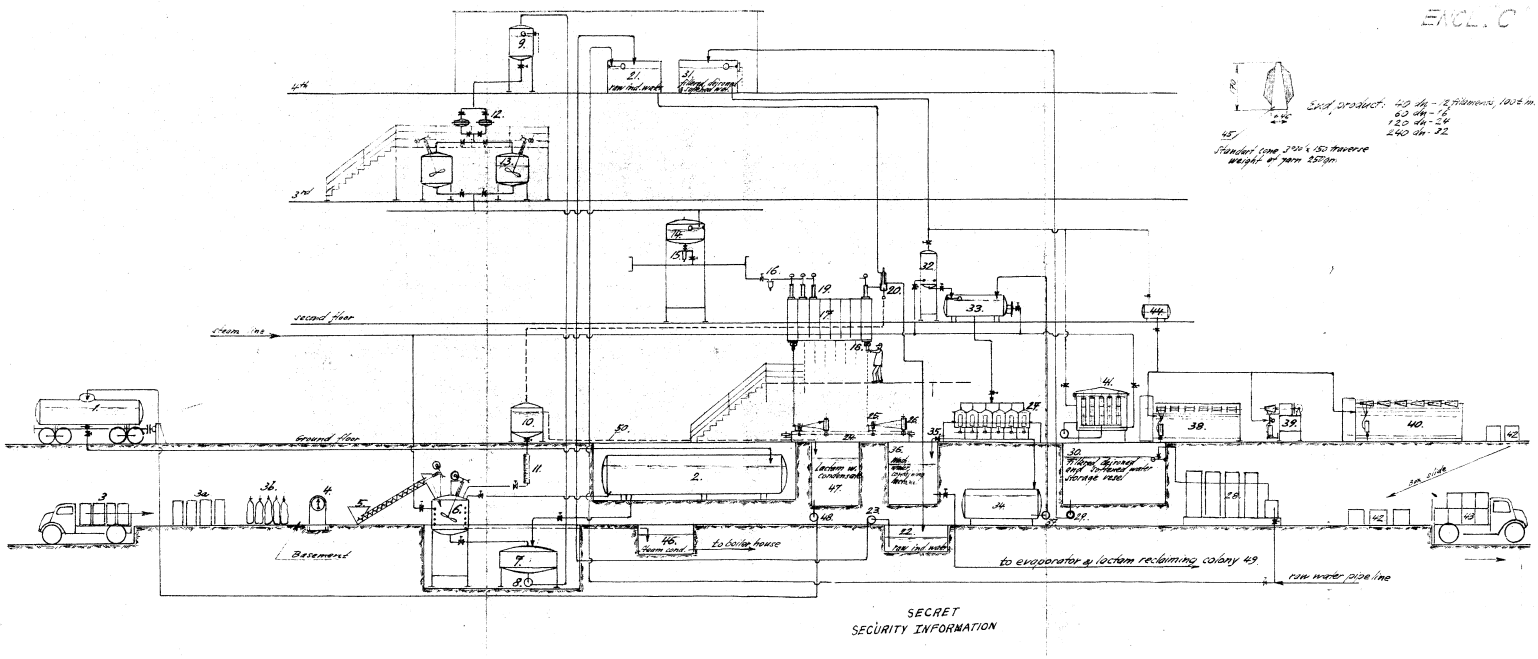
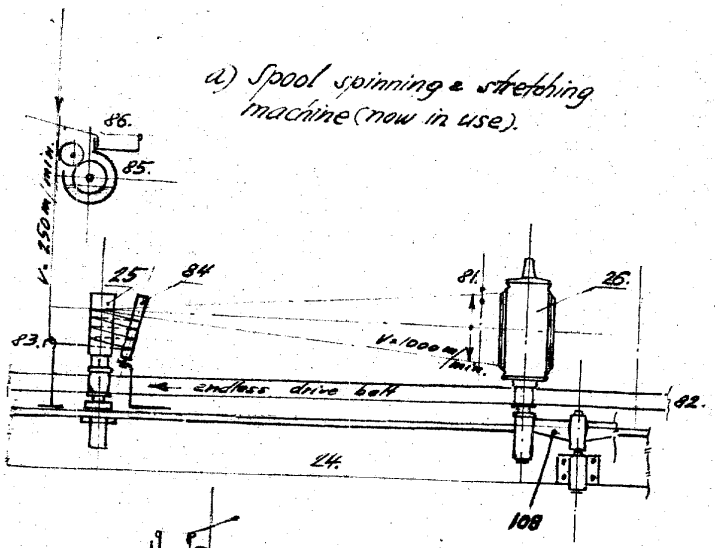
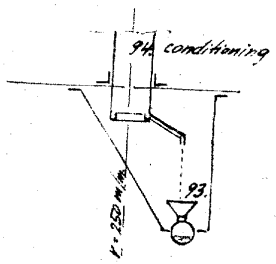
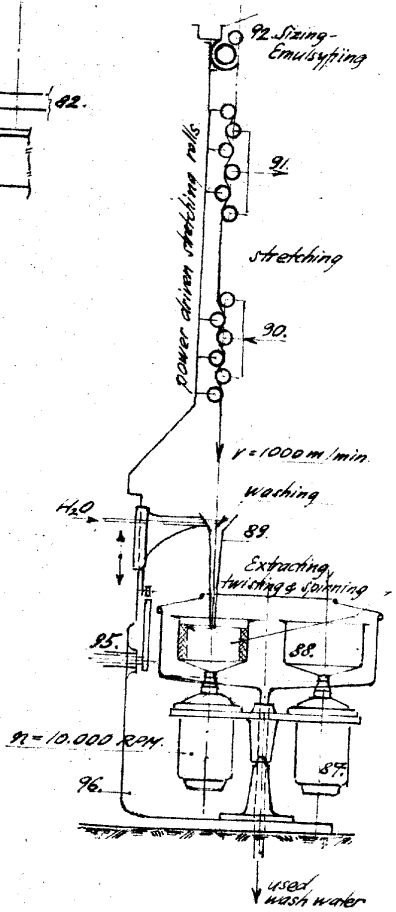


SPINNING AND STRETCHING MACHINERY

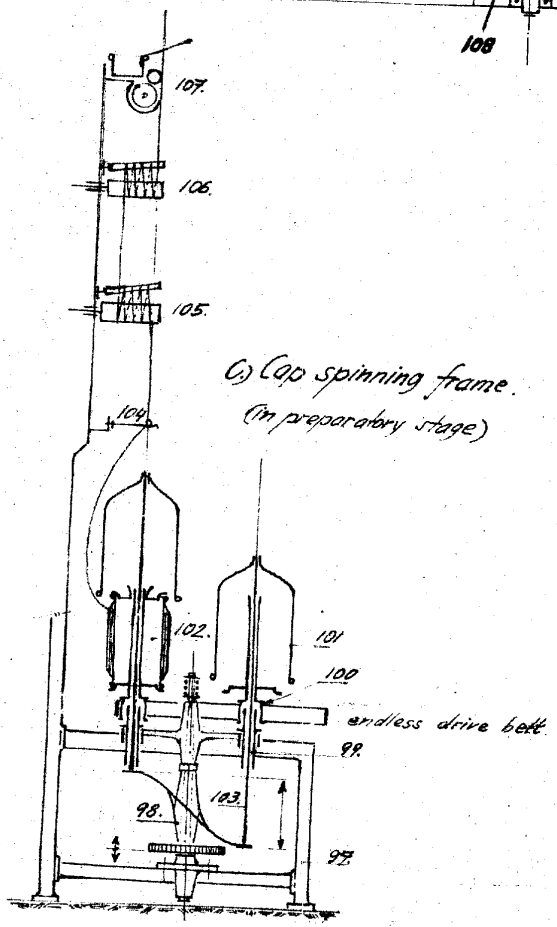
ENCL. "E"







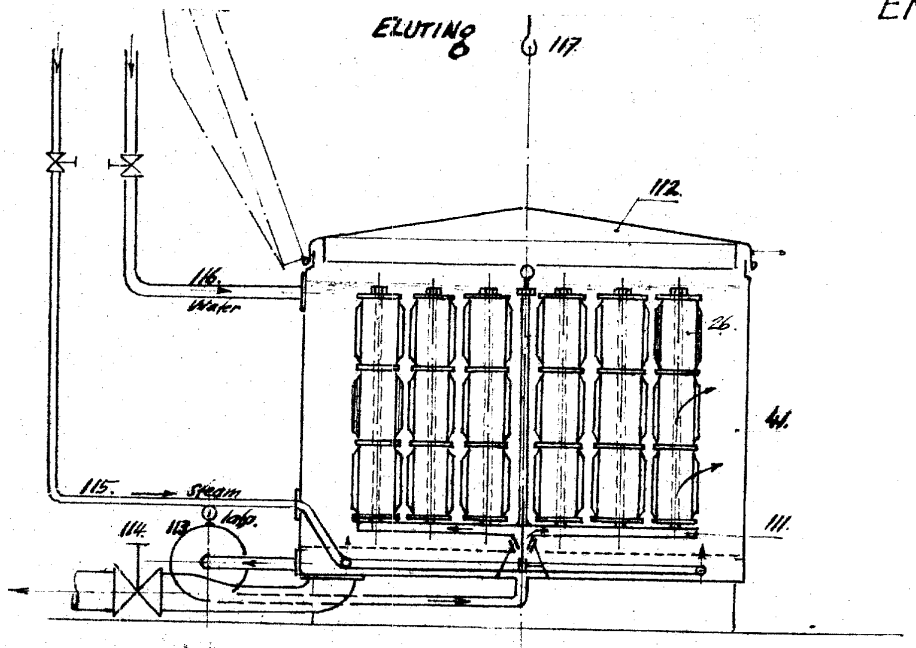
b) Experimental pot spinning machine (being in trial stage)



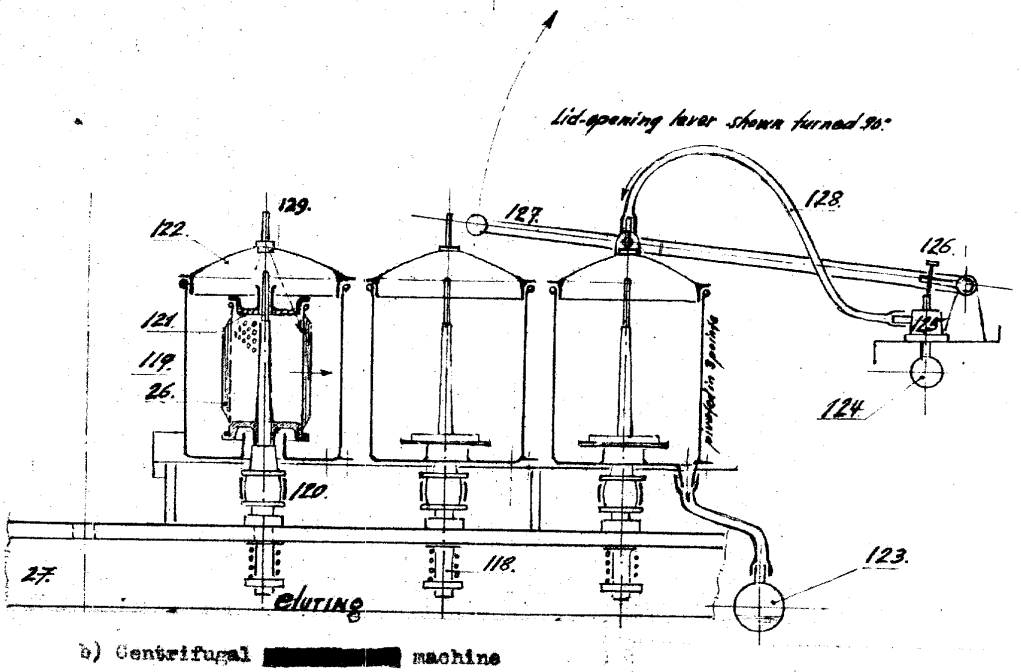
SECRET
SECURITY INFORMATION

[redacted] MACHINES

ENCL. "F"



a) Pressure washing machine

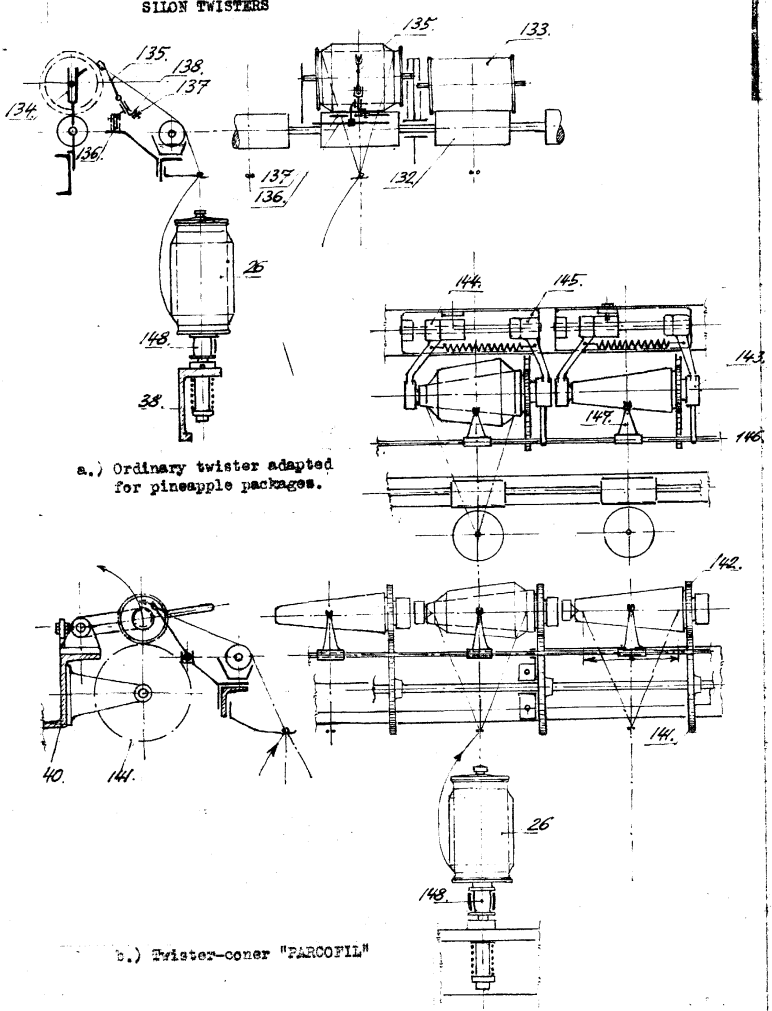


b) Centrifugal [redacted] machine

SECRET
SECURITY INFORMATION

ENCL. "6"

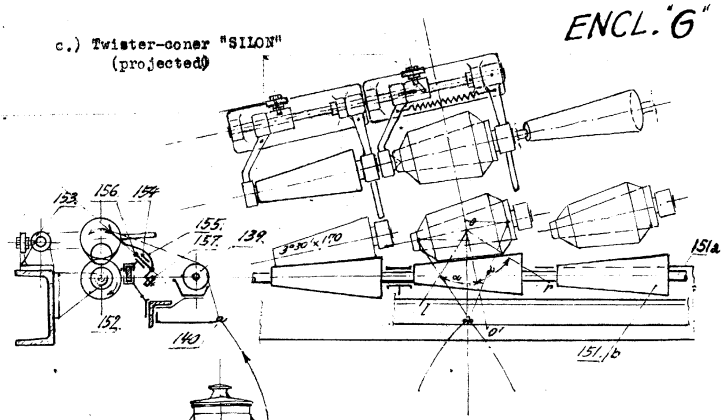
SILON TWISTERS



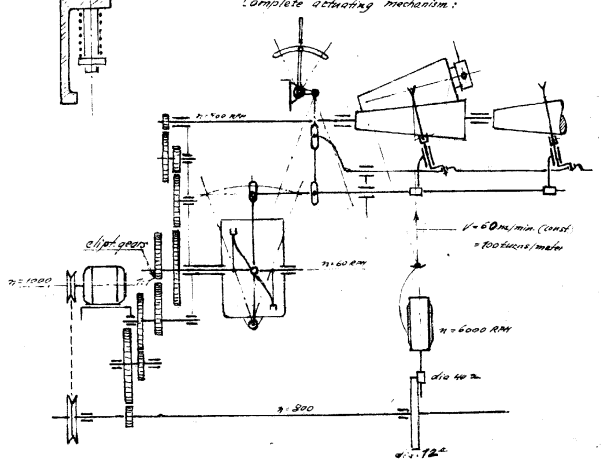
a.) Ordinary twister adapted for pineapple packages.

b.) Twister-coner "PARCOFIL"

c.) Twister-coner "SILON" (projected)



Complete actuating mechanism:



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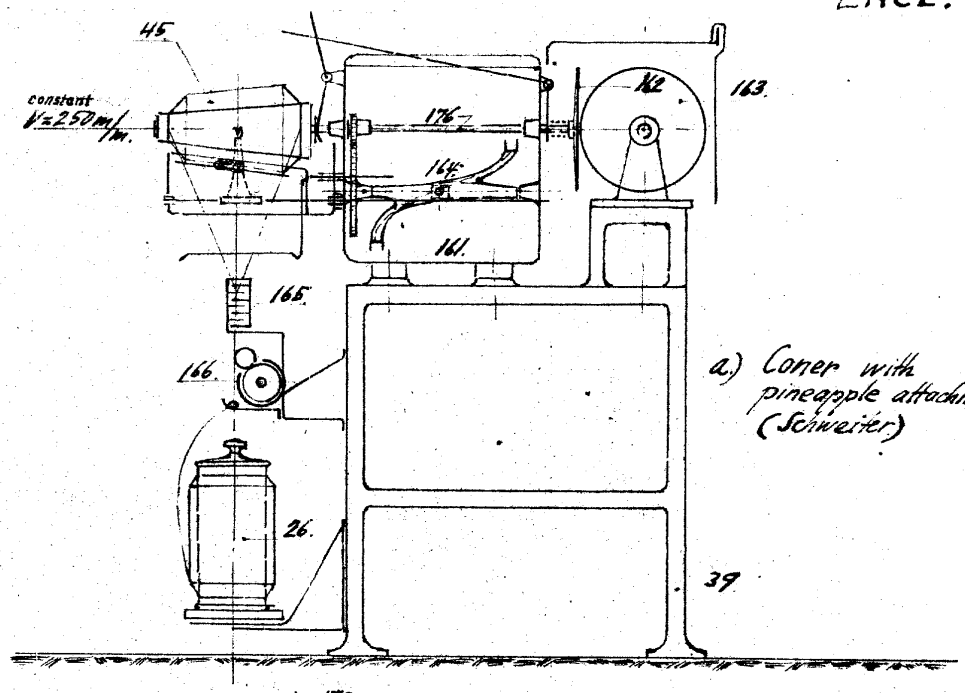
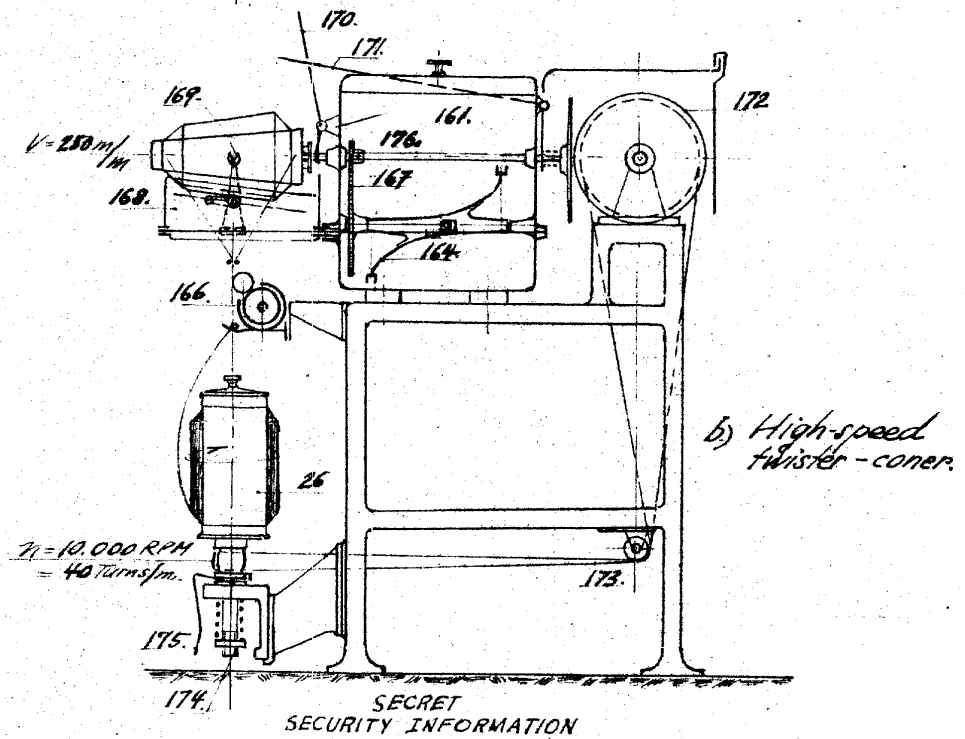
SILON CONER AND HIGH-SPEED TWISTER-CONER

ENCL. "H"

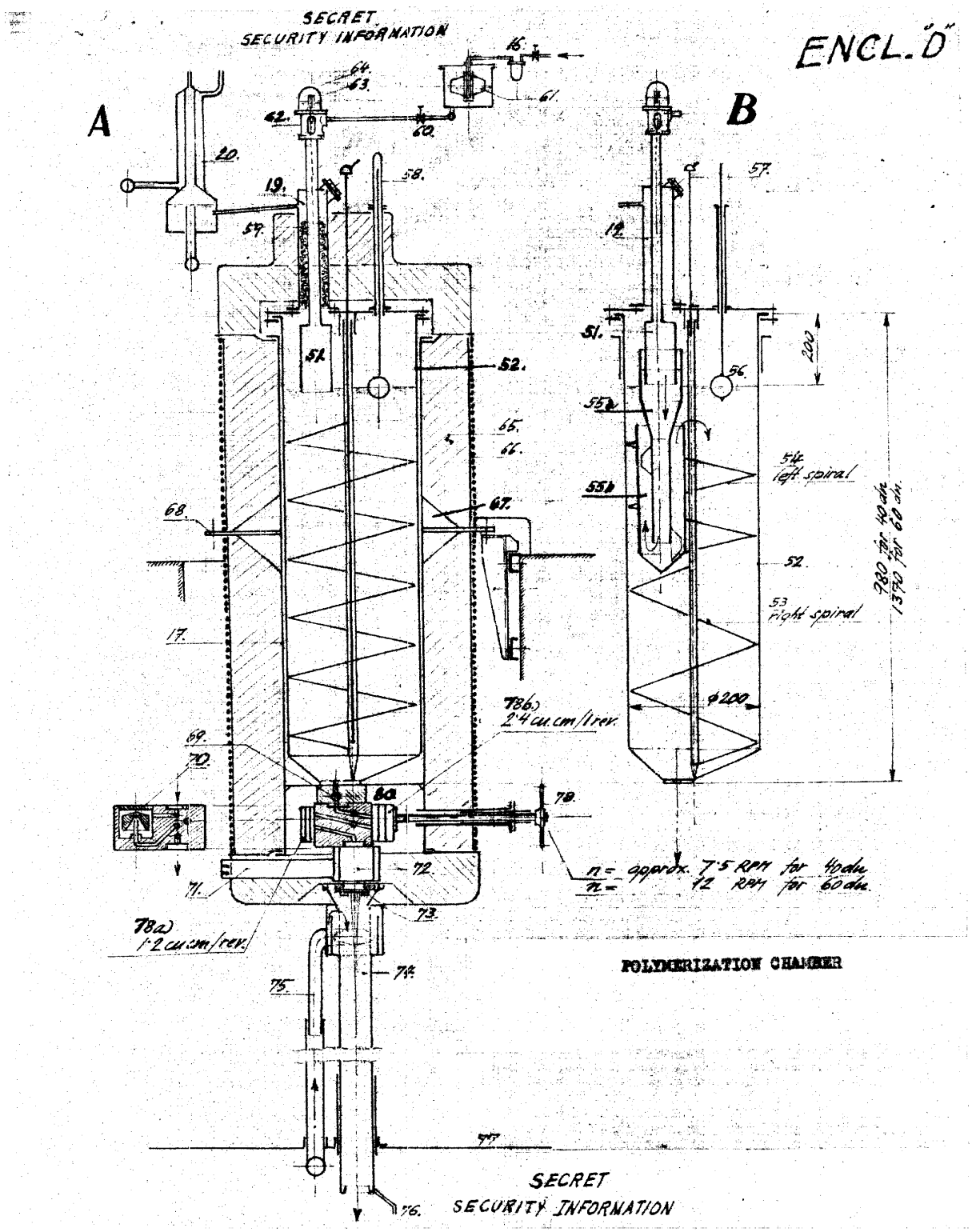


a.) Coner with pineapple attachment (Schweiter)

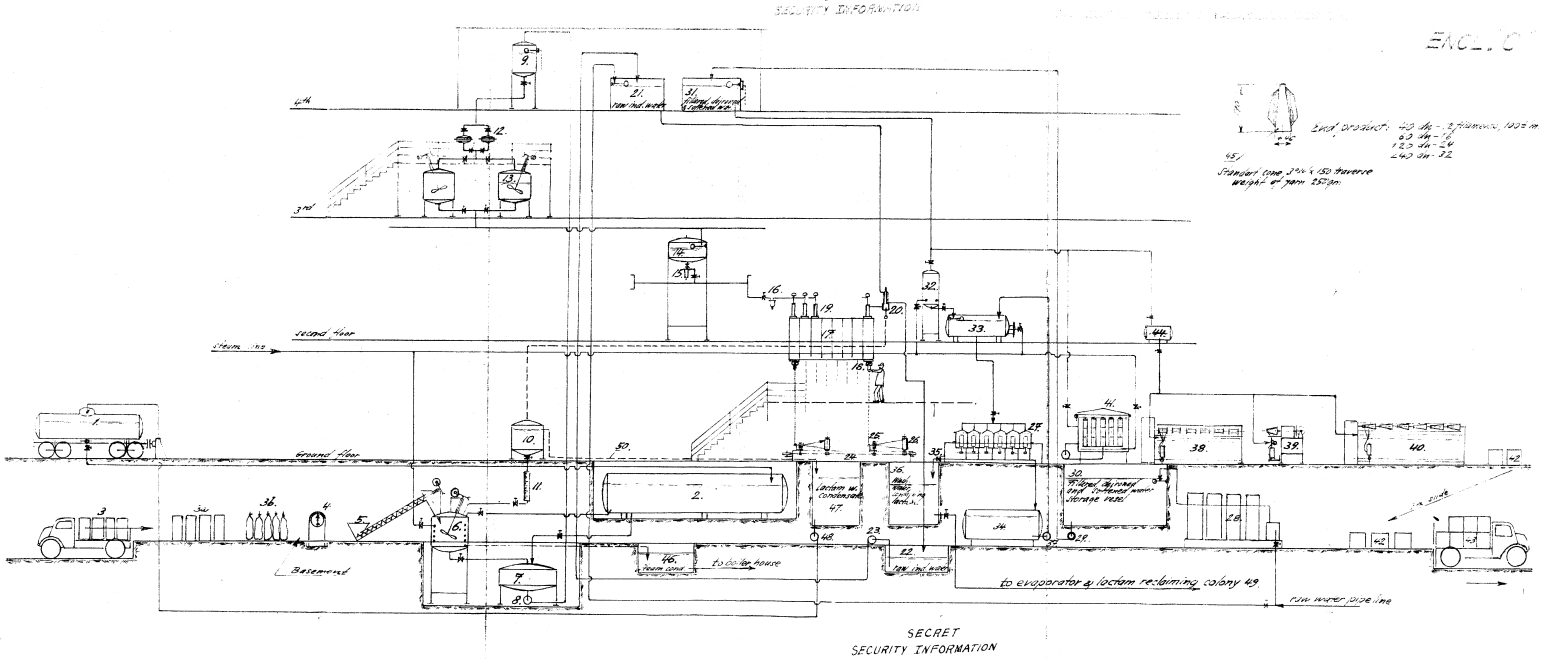


b.) High-speed twister-coner.

SECRET
SECURITY INFORMATION

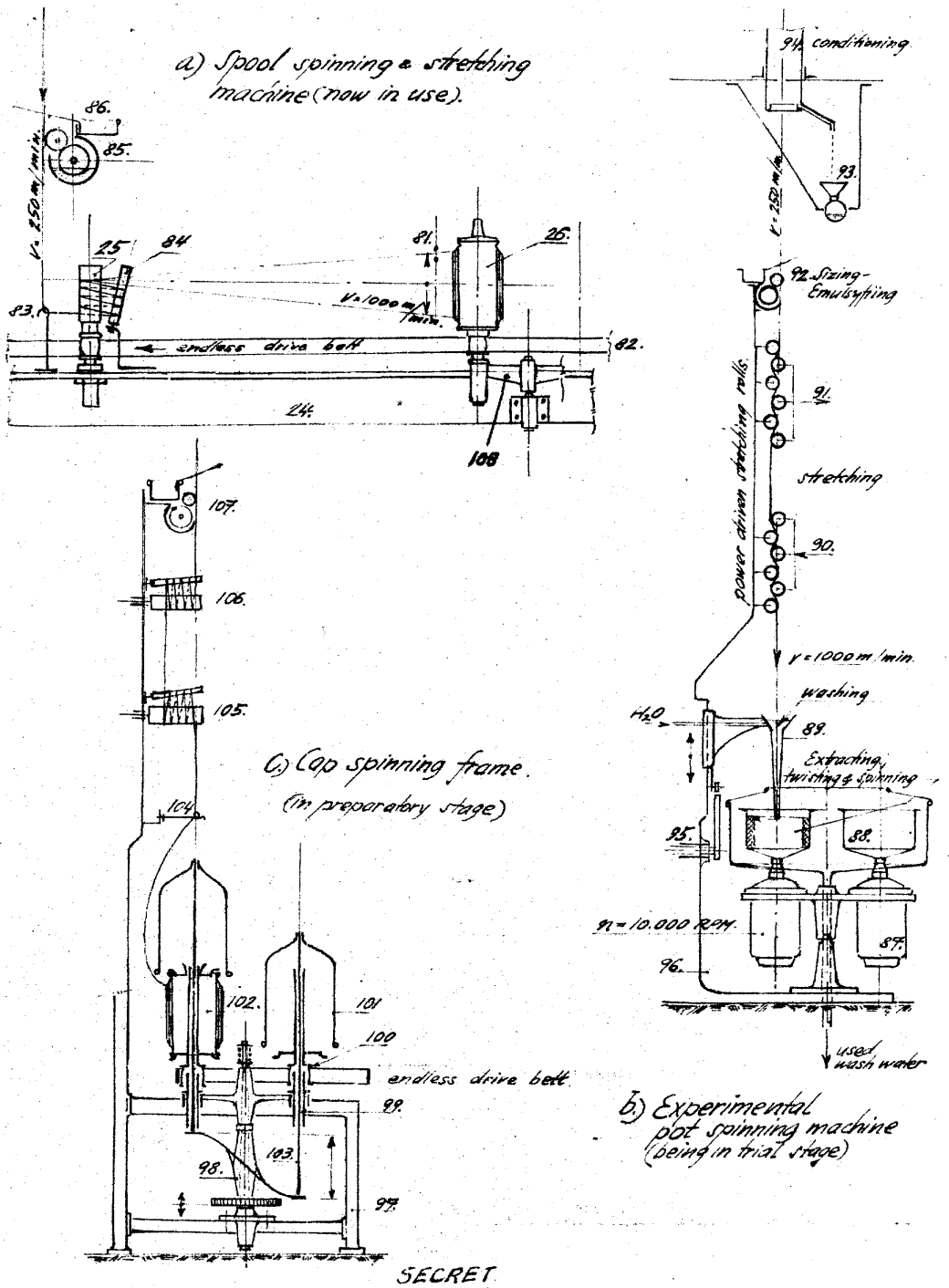


ENCL. C



ENCL. "E"

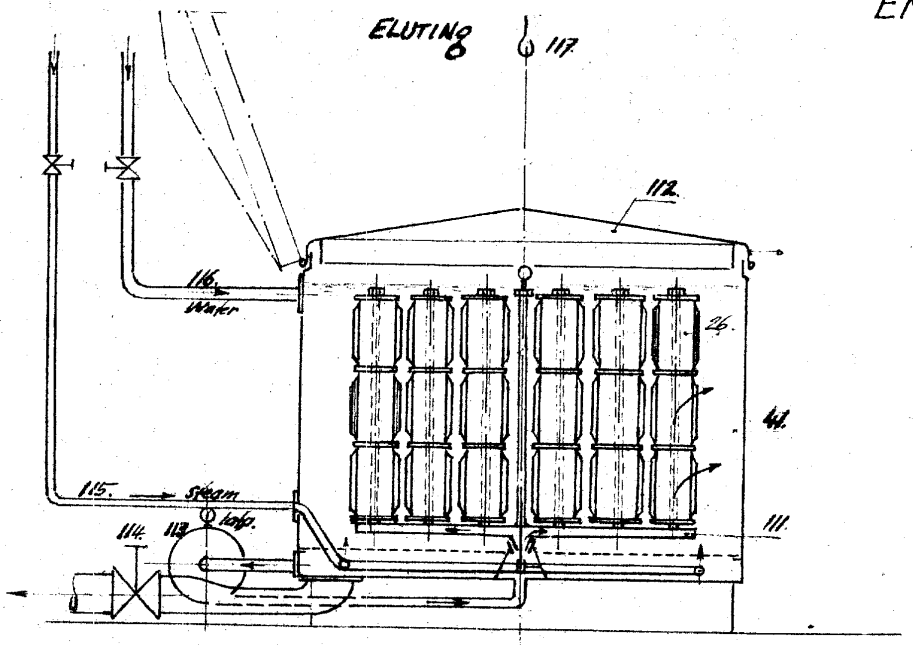
SPINNING AND STRETCHING MACHINERY



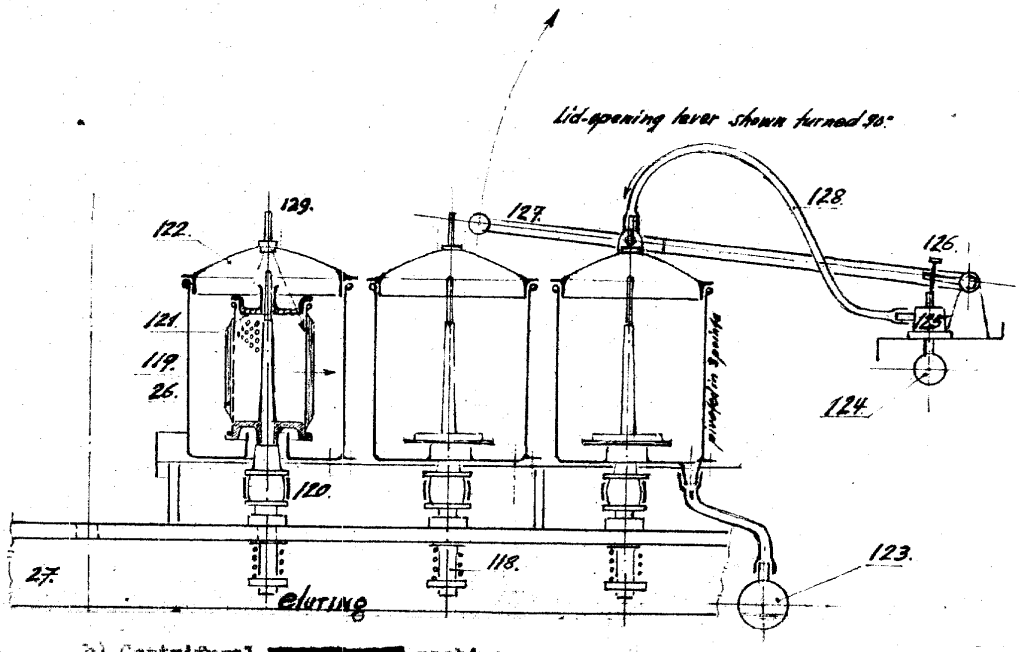
SECRET
SECURITY INFORMATION

ENCL. "F"

[redacted] MACHINES



a) Pressure washing machine

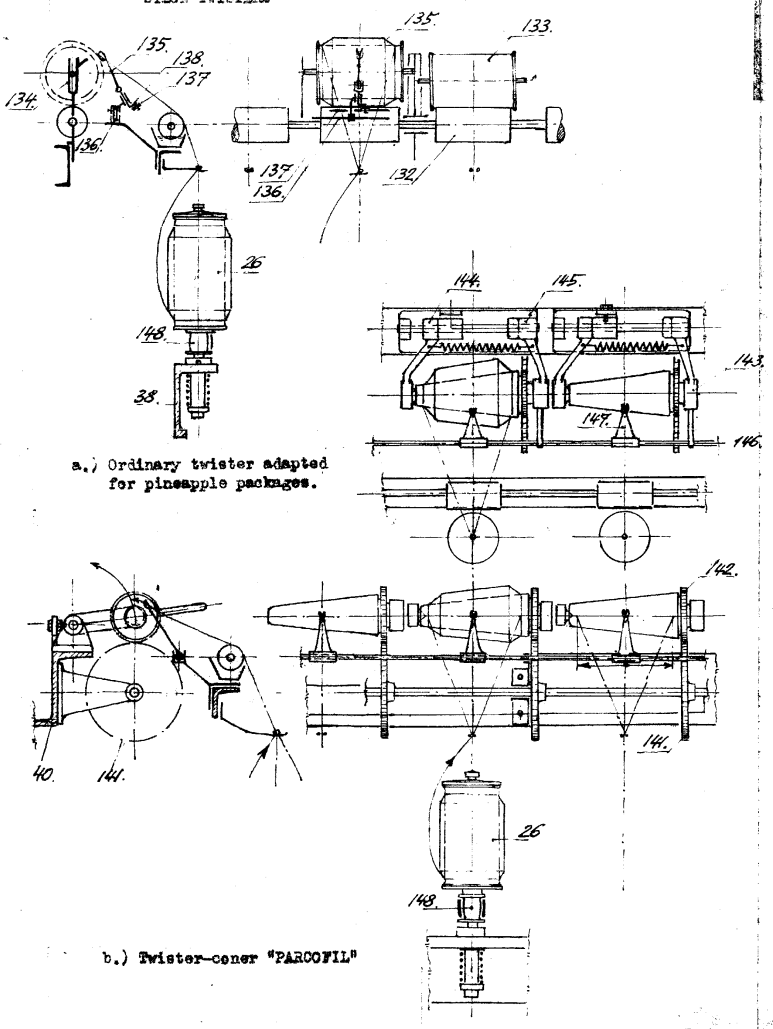


b) Centrifugal [redacted] machine

SECRET
SECURITY INFORMATION

ENCL. "G"

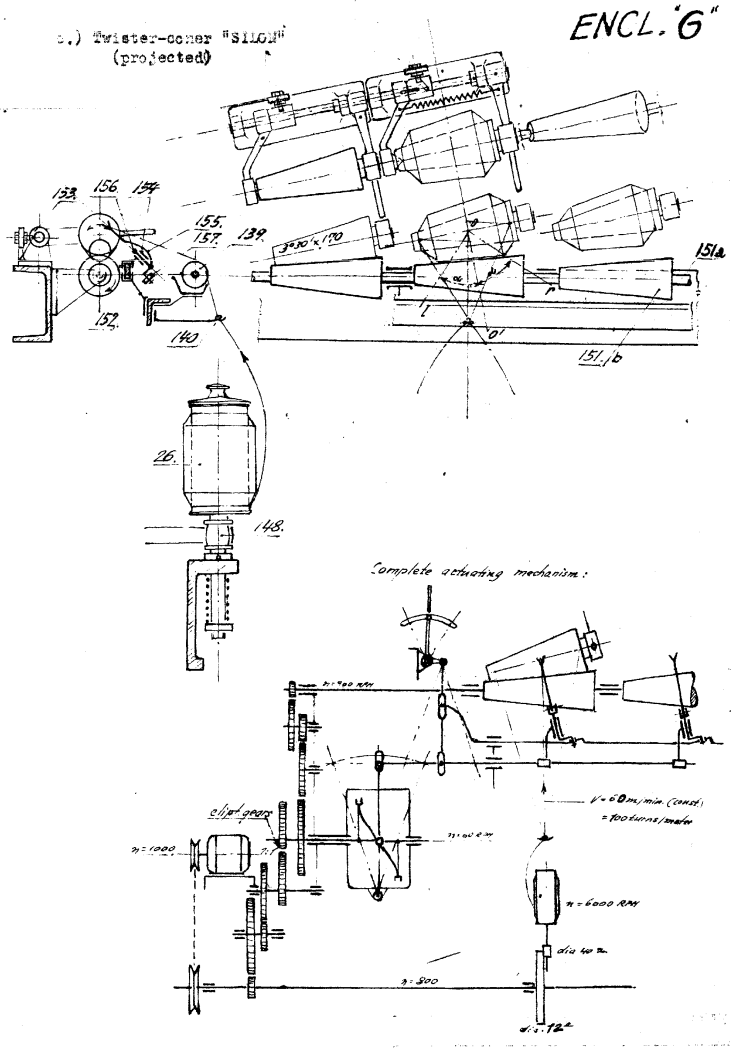
SILON TWISTERS



a.) Ordinary twister adapted for pineapple packages.

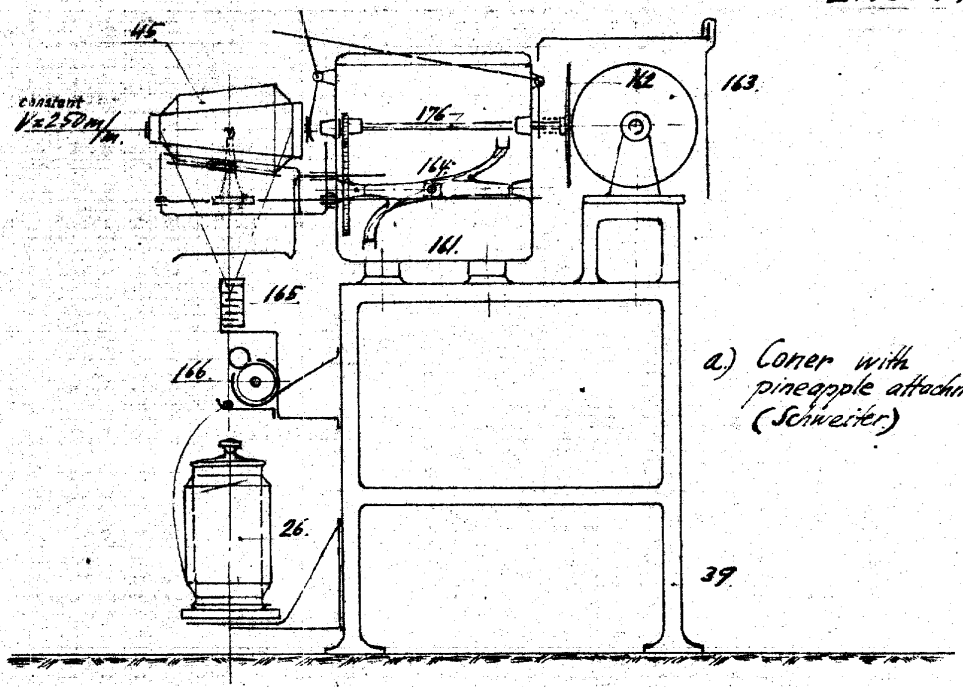
b.) Twister-coner "PARCOFIL"

c.) Twister-coner "SILON" (projected)

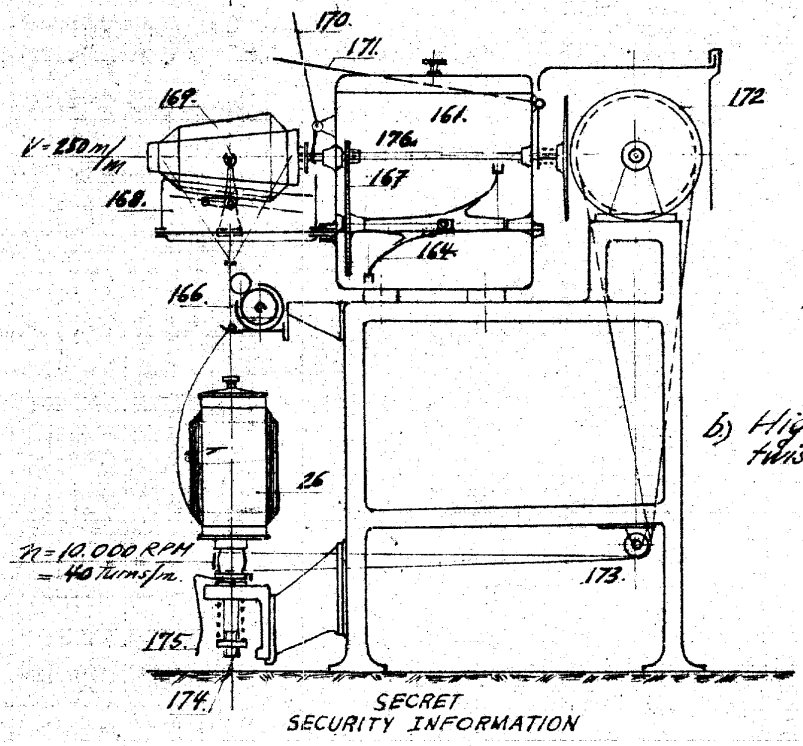


SILON CONER AND HIGH-SPEED TWISTER-CONER

ENCL. "H"



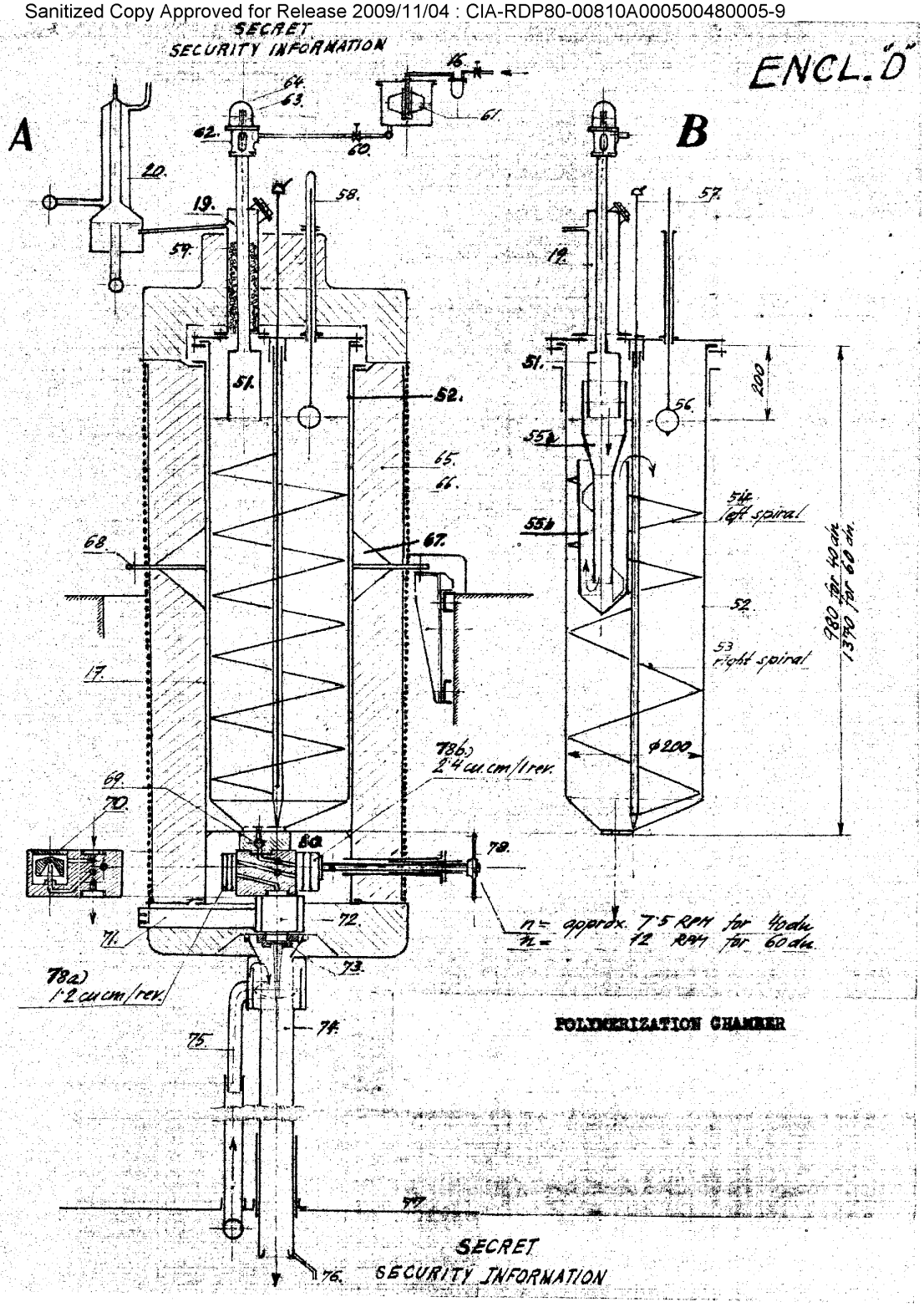
a.) Coner with pineapple attachment (Schweiter)



b.) High-speed twister-coner.

SECRET
SECURITY INFORMATION

ENCL. "D"



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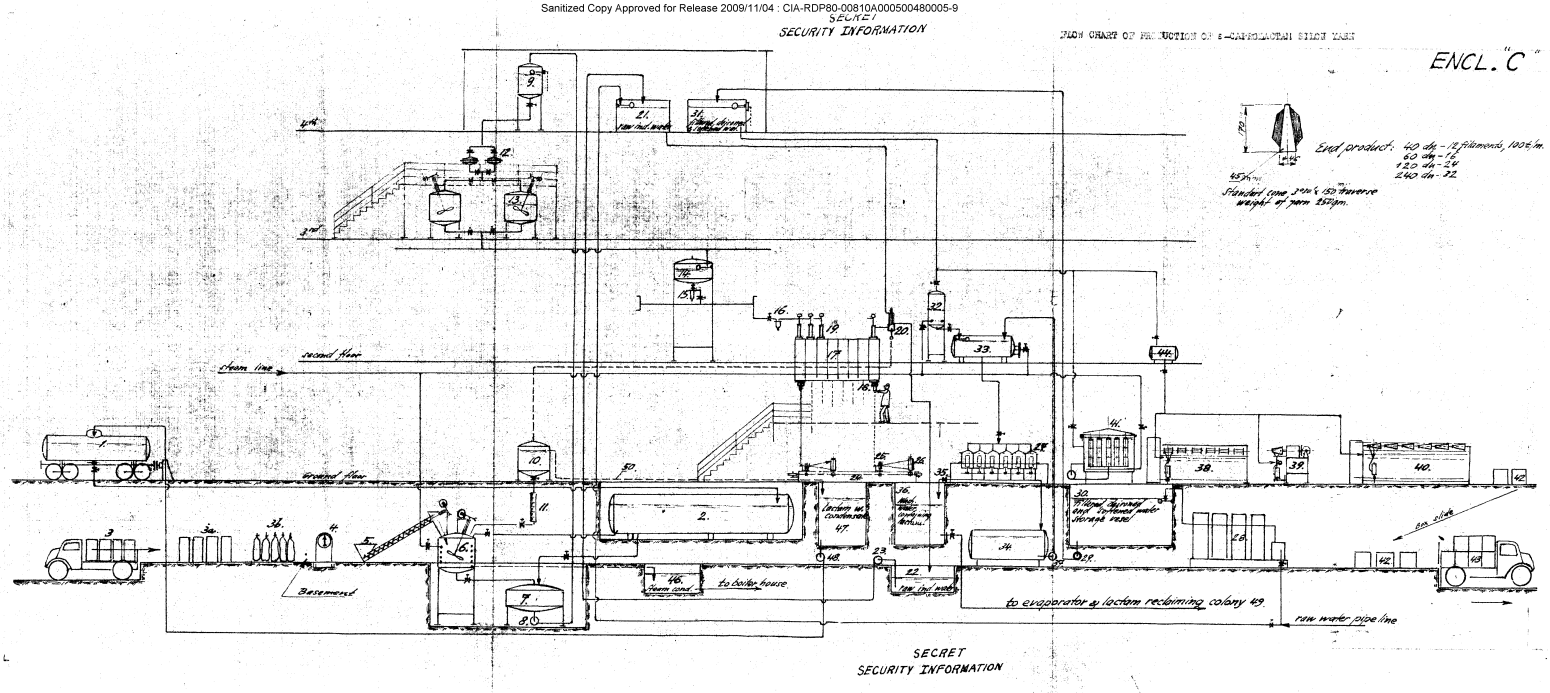
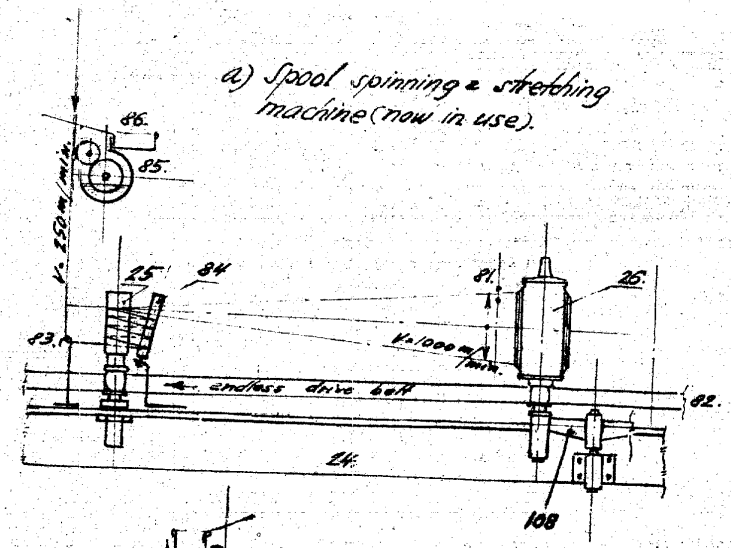
FLOW CHART OF PRODUCTION OF 6-CAPROLACTAM SILON YARN

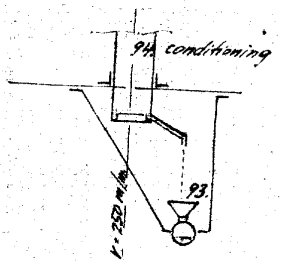
ENCL. "C"

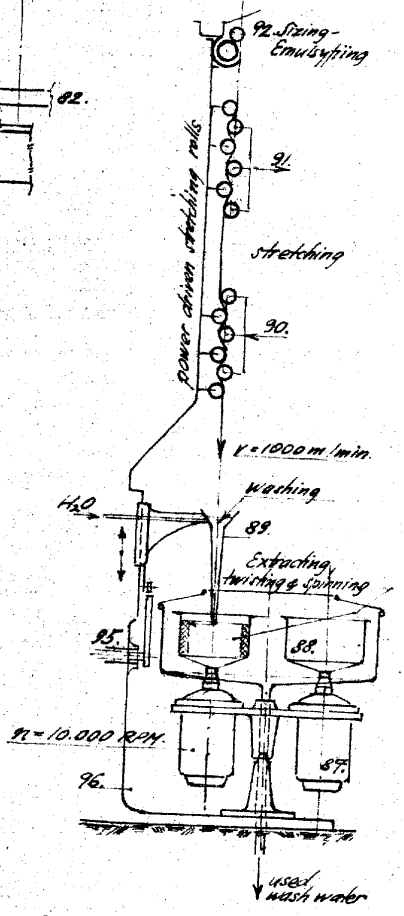


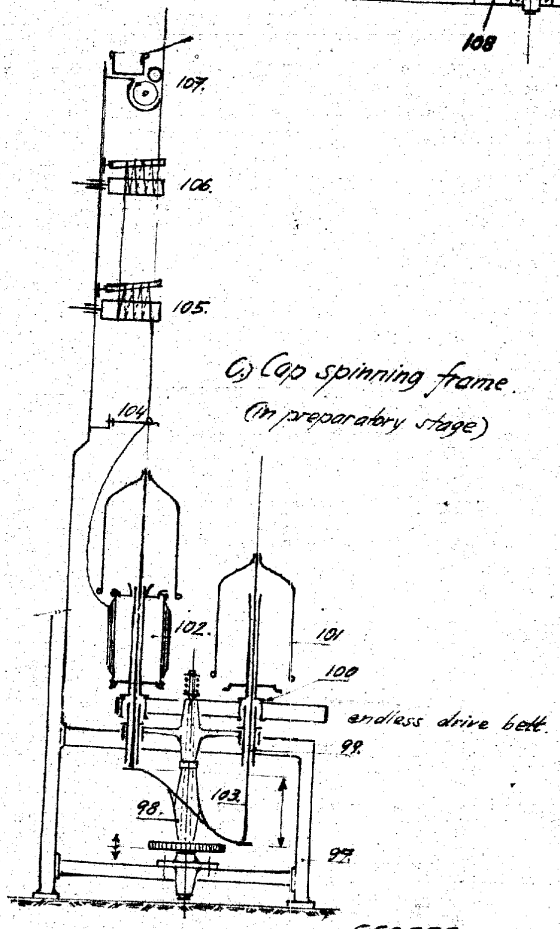
SPINNING AND STRETCHING MACHINERY

ENCL. "E"







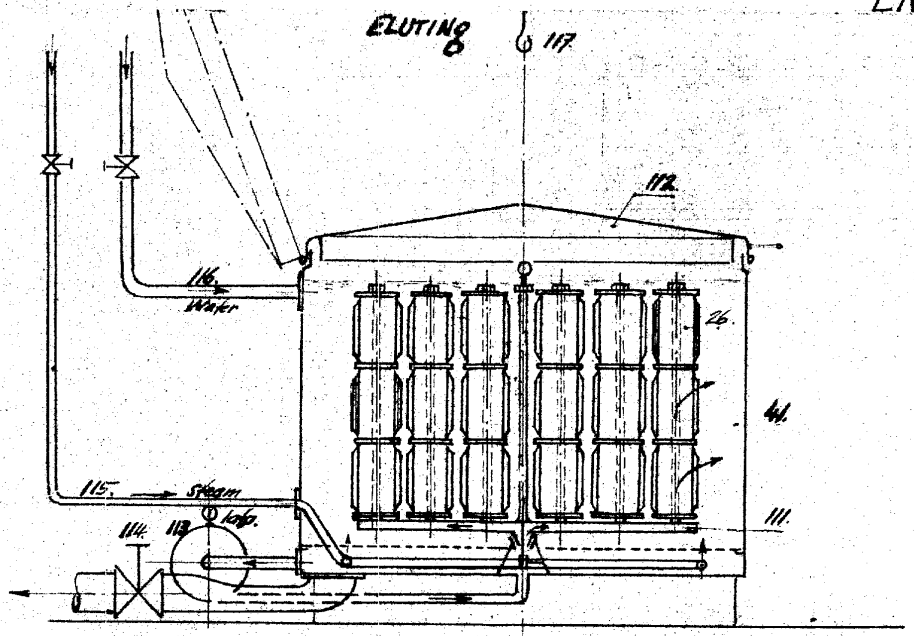


b.) Experimental pot spinning machine (being in trial stage)

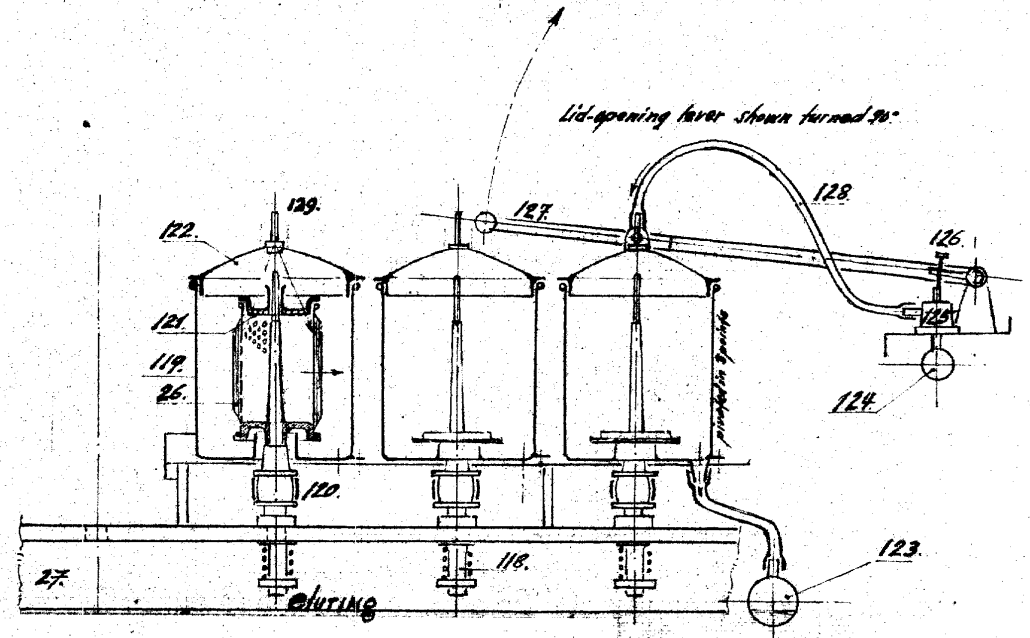
SECRET
SECURITY INFORMATION

MONOMER [redacted] MACHINES

ENCL. "F"



a) Pressure washing machine

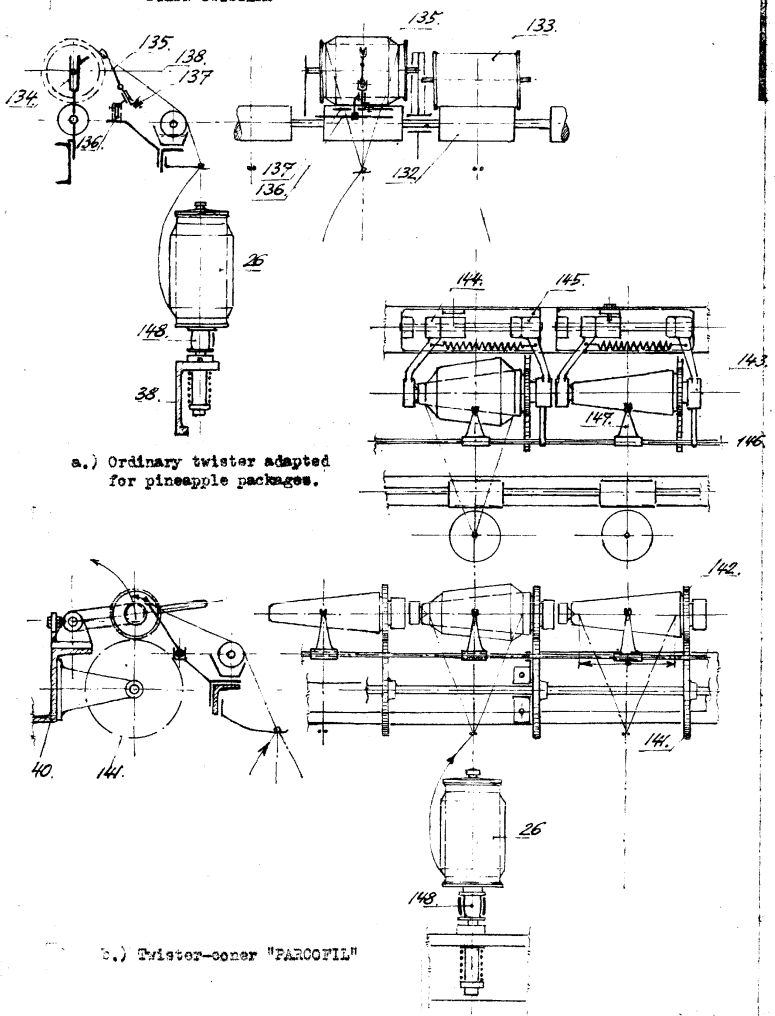


b) Centrifugal [redacted] machine

SECRET
SECURITY INFORMATION

ENCL. "G"

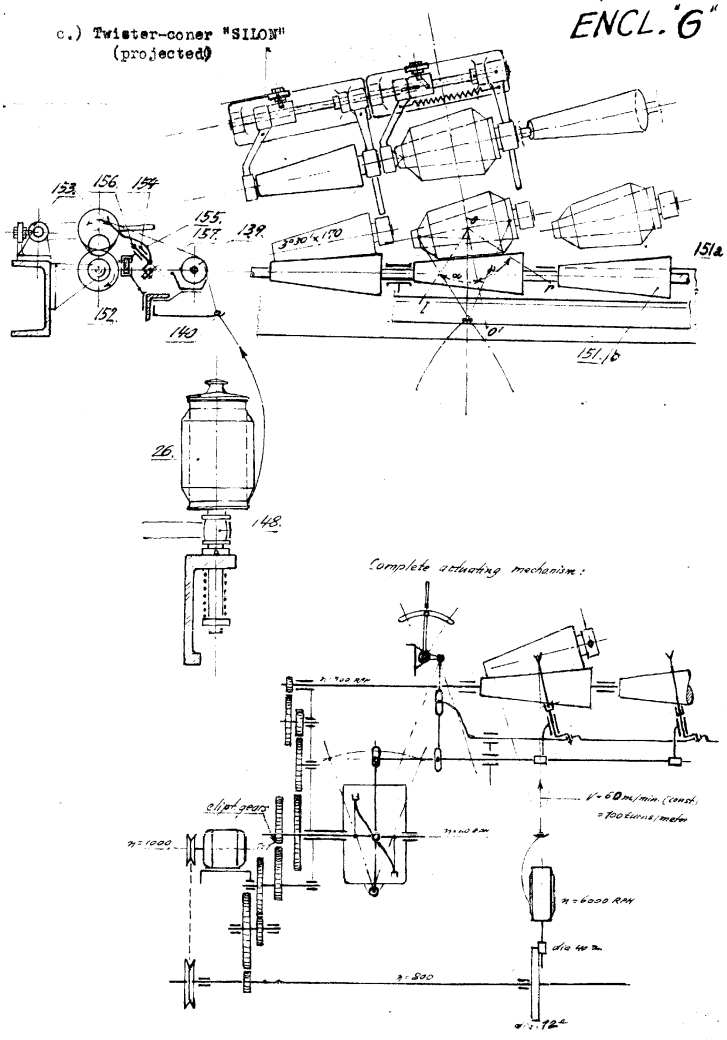
SILON TWISTERS



a.) Ordinary twister adapted for pineapple packages.

b.) Twister-coner "PARCOFIL"

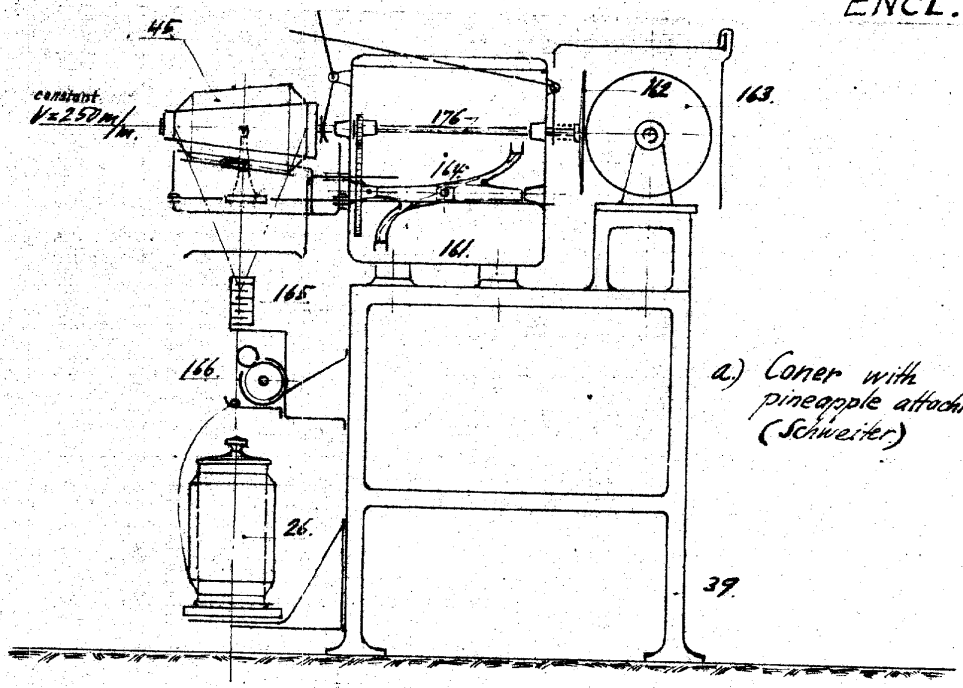
c.) Twister-coner "SILON" (projected)



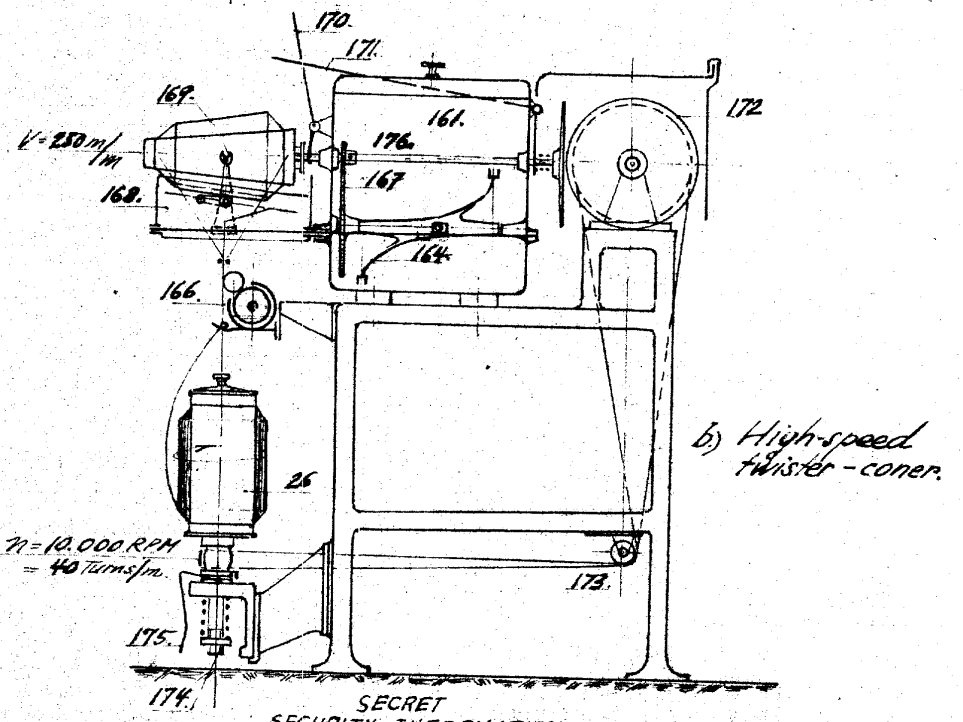
SECRET
SECURITY INFOMATION

SILON CONER AND HIGH-SPEED TWISTER-CONER

ENCL. "H"



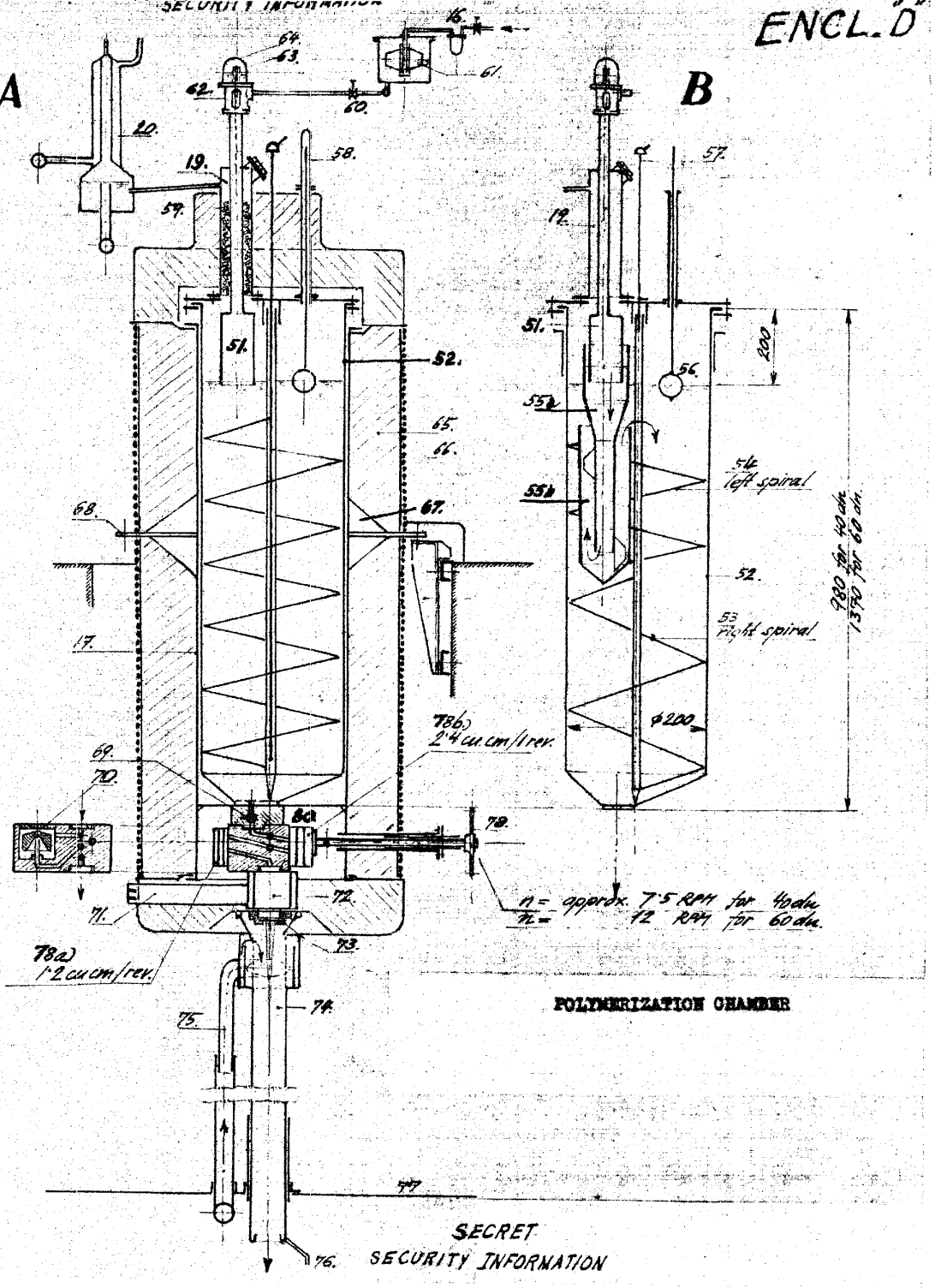
a.) Coner with pineapple attachment (Schweiter)



b.) High-speed twister-coner.

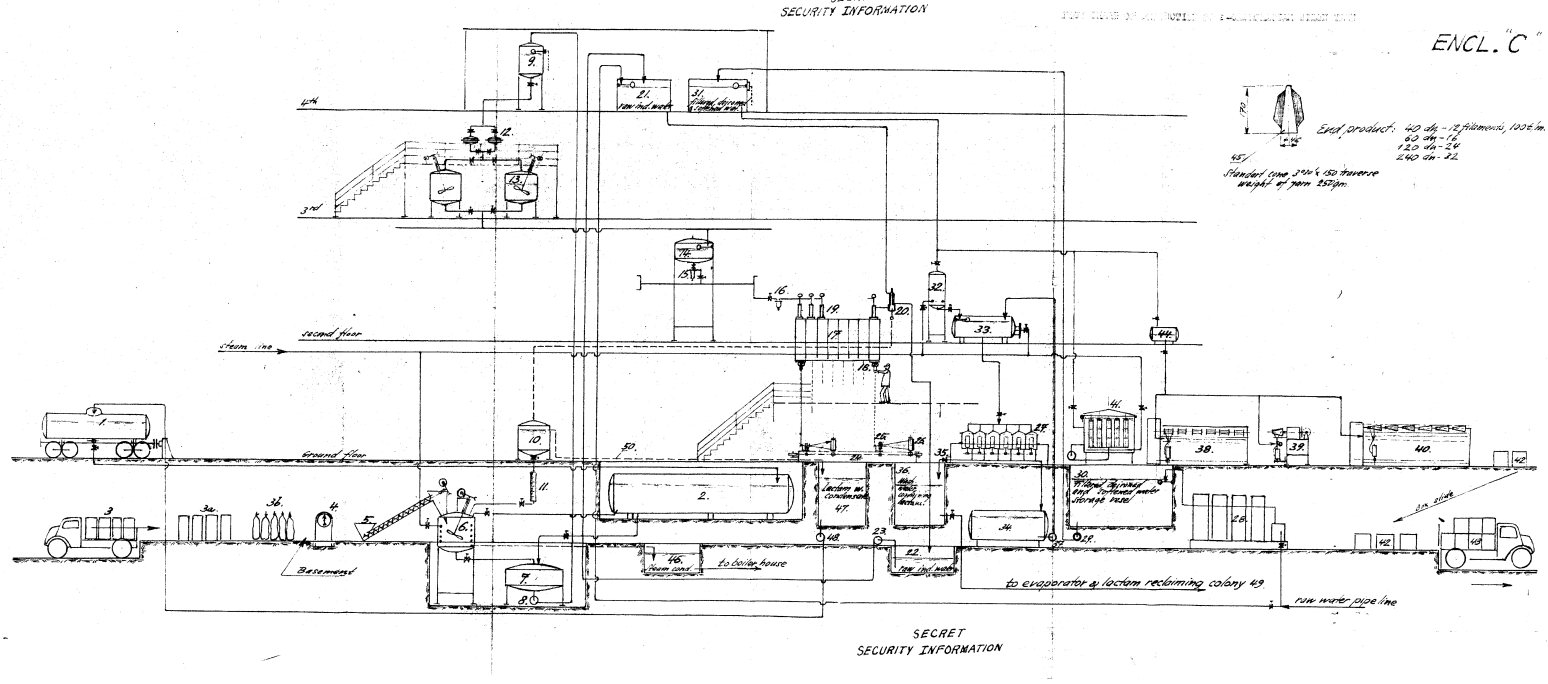
SECRET
SECURITY INFORMATION

ENCL. "D"



POLYMERIZATION CHAMBER

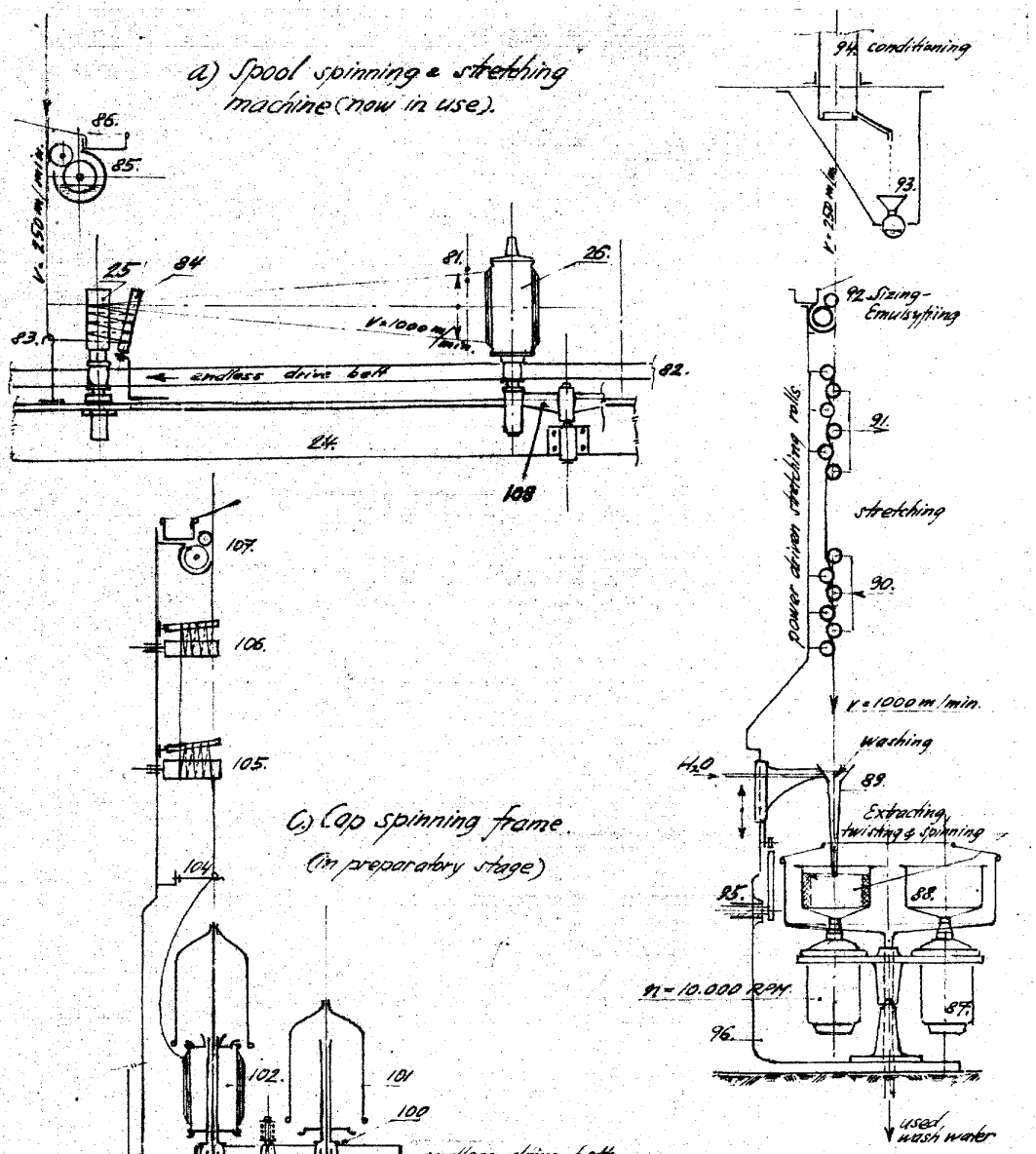
ENCL. "C"



SECRET
SECURITY INFORMATION

ENCL. "E"

SPINNING AND STRETCHING MACHINERY

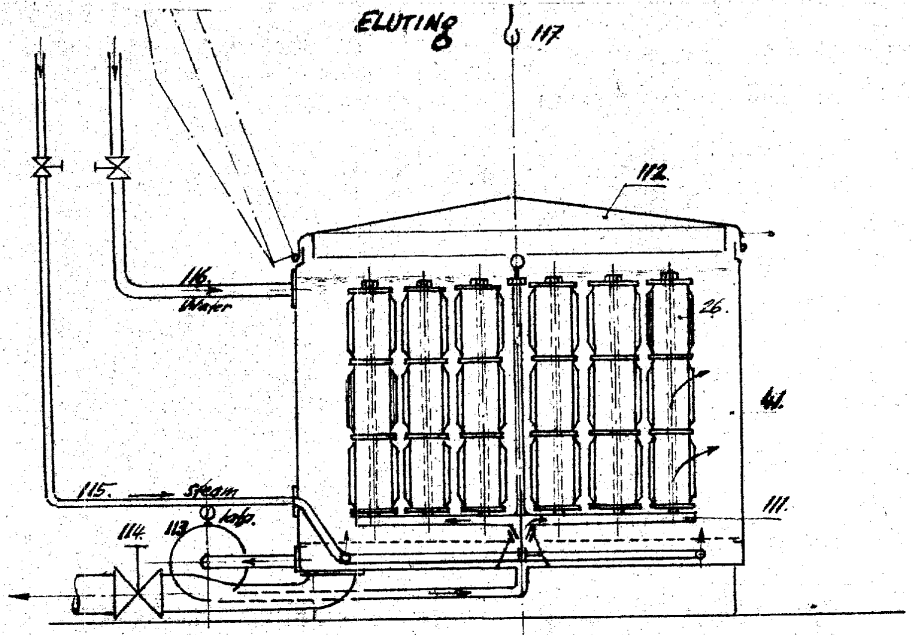


SECRET
SECURITY INFORMATION

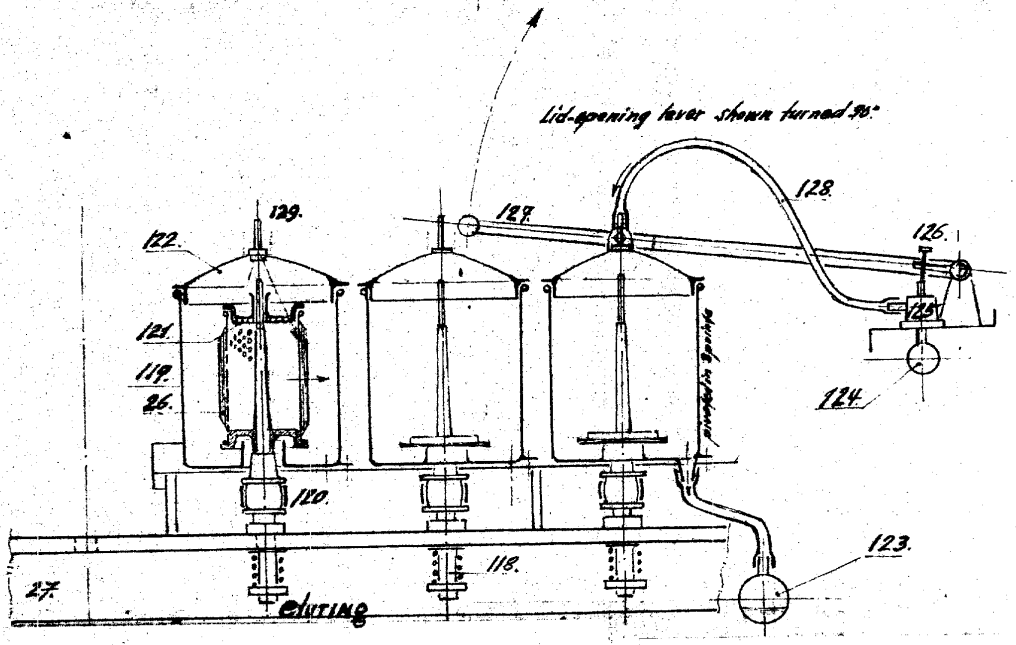
SECRET
SECURITY INFORMATION

MONOMER [redacted] MACHINES

ENCL. "F"



a) Pressure washing machine

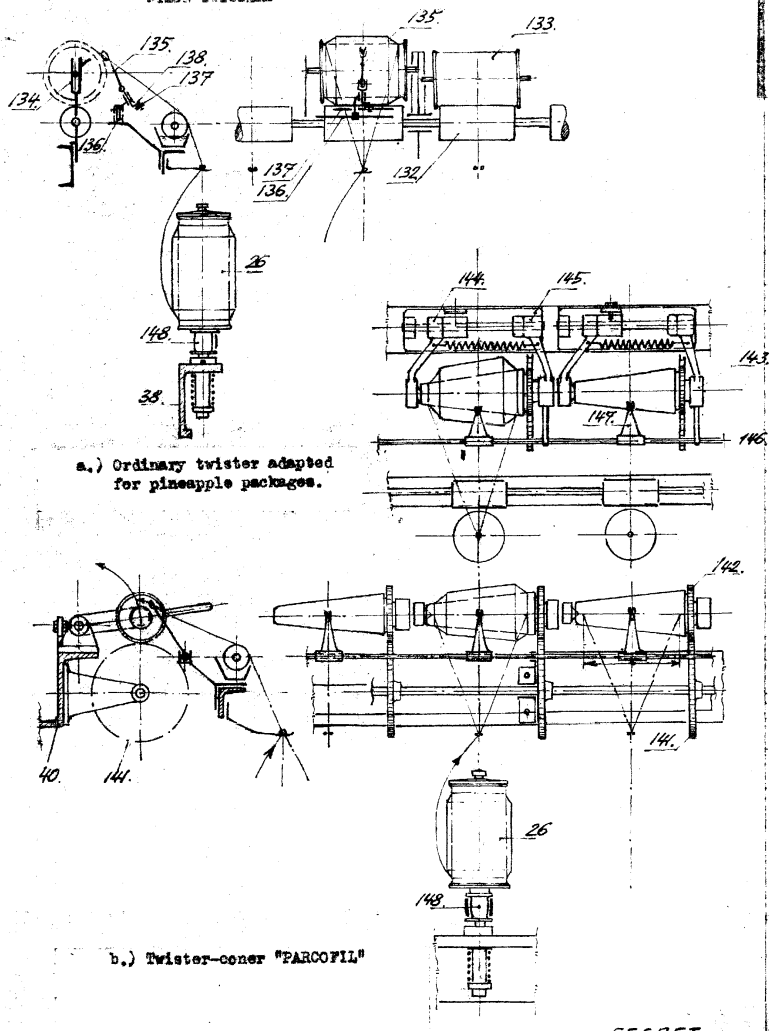


b) Centrifugal [redacted] machine

SECRET
SECURITY INFORMATION

ENCL. "G"

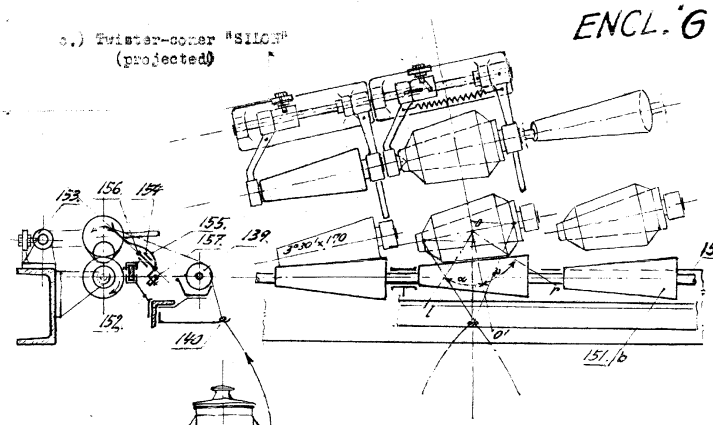
SILON TWISTERS



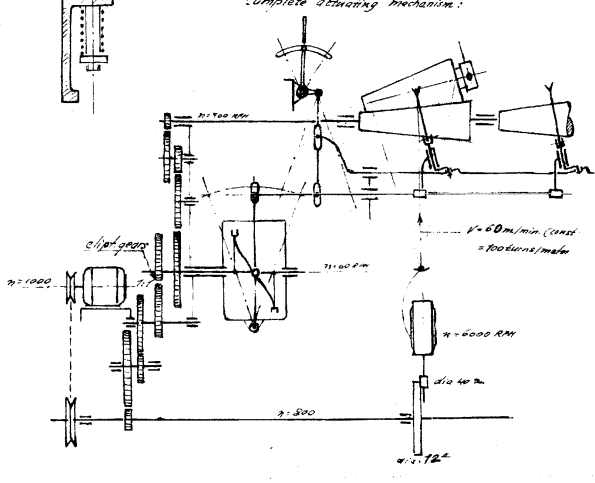
a.) Ordinary twister adapted for pineapple packages.

b.) Twister-coner "PARCOFIL"

c.) Twister-coner "SILOF" (projected)



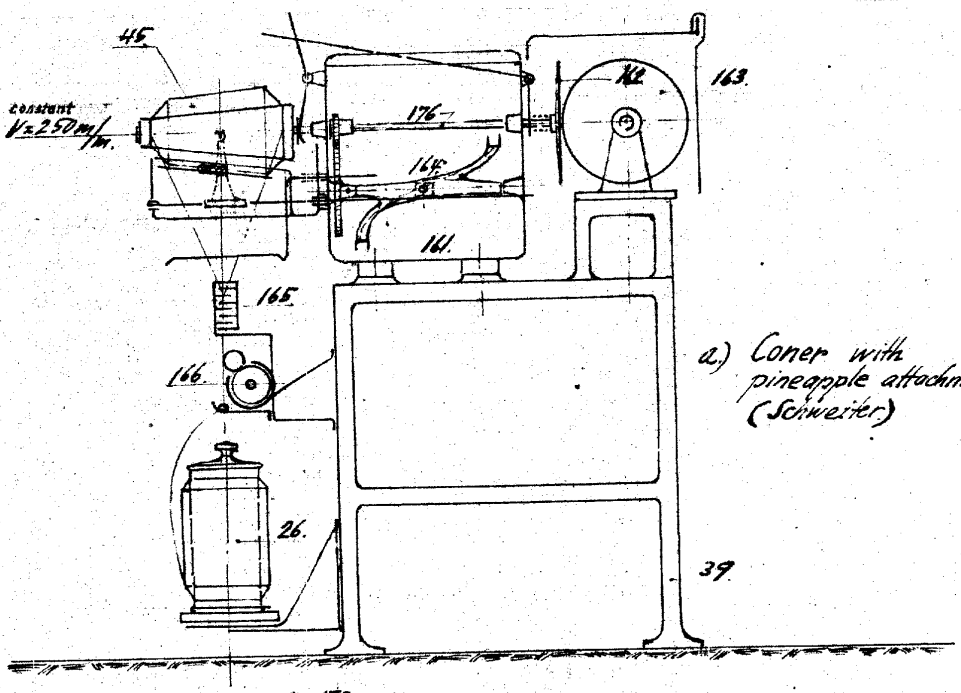
Complete actuating mechanism:



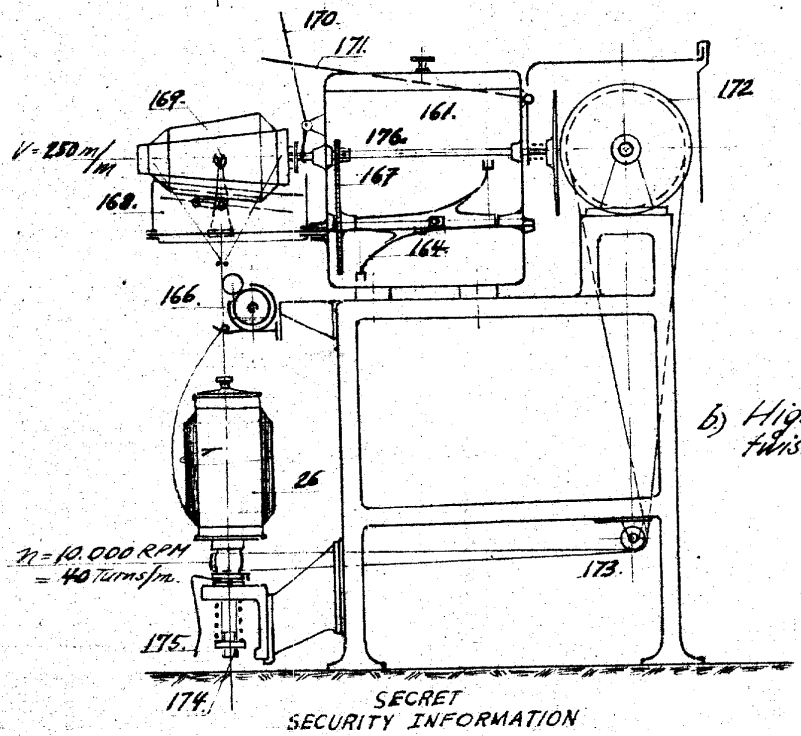
SECRET
SECURITY INFOMATION

SILOE CONER AND HIGH-SPEED TWISTER-CONER

ENCL. "H"



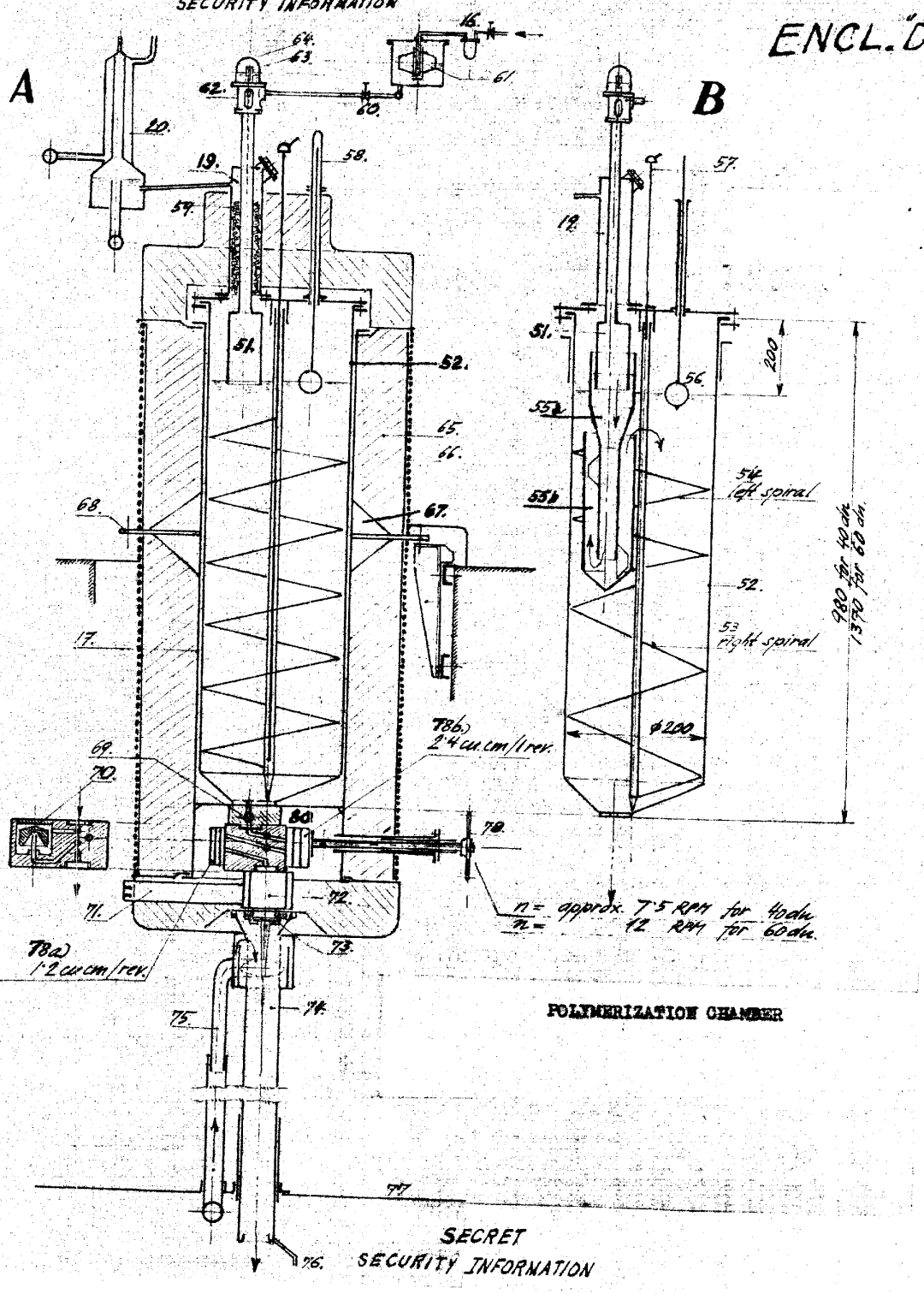
a) Coner with pineapple attachment. (Schweiter)



b) High-speed twister-coner.

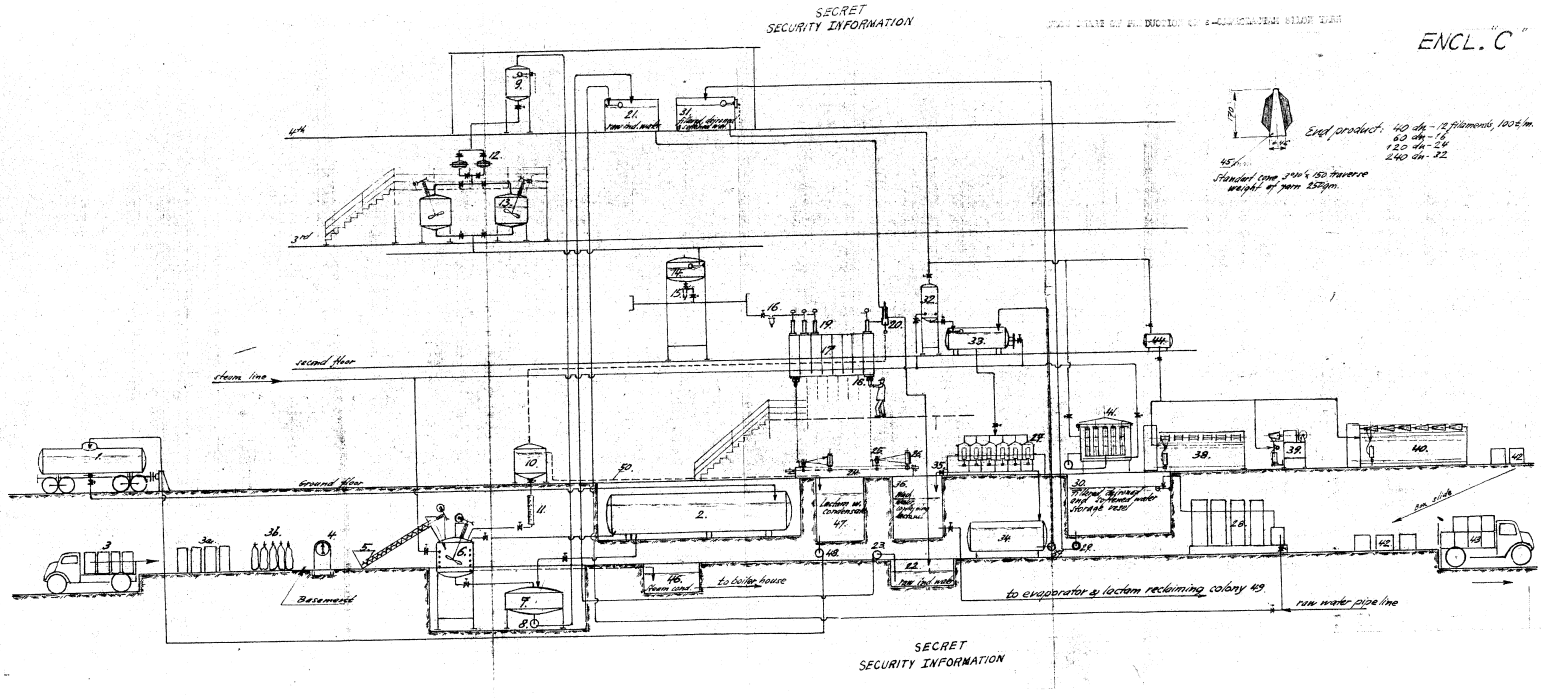
SECRET
SECURITY INFORMATION

ENCL. "D"



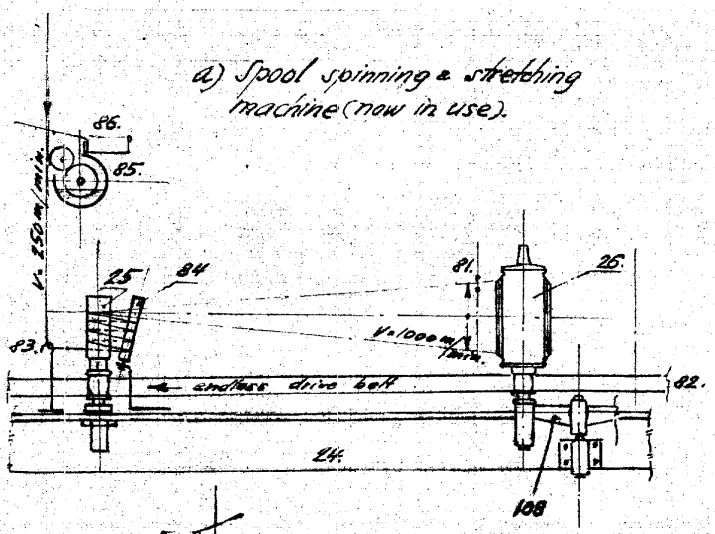
POLYMERIZATION CHAMBER

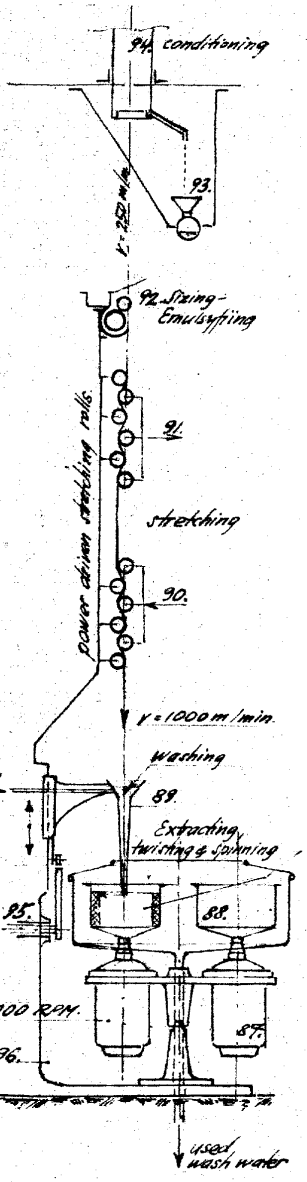
ENCL. "C"

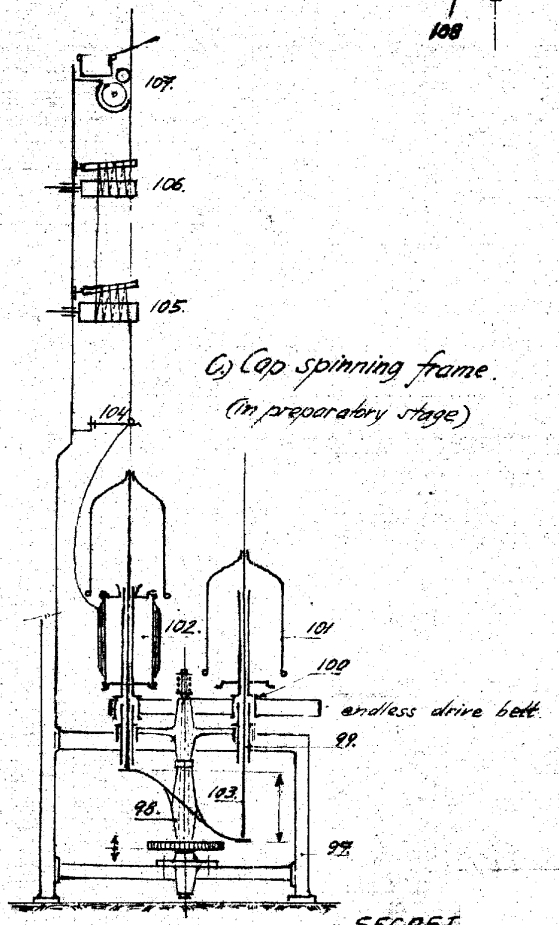


ENCL. "E"

SPINNING AND STRETCHING MACHINERY





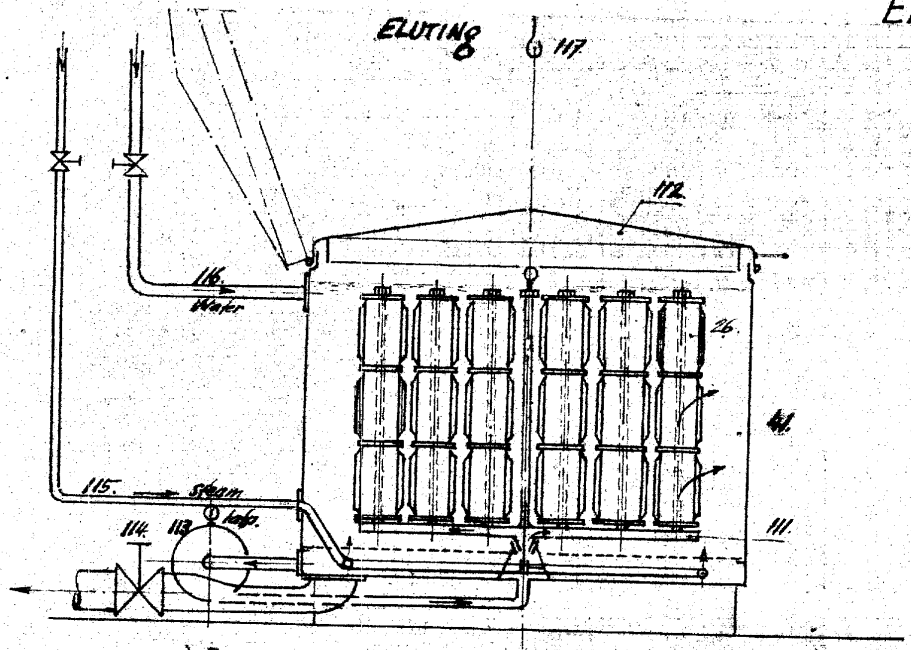


b) Experimental pot spinning machine (being in trial stage)

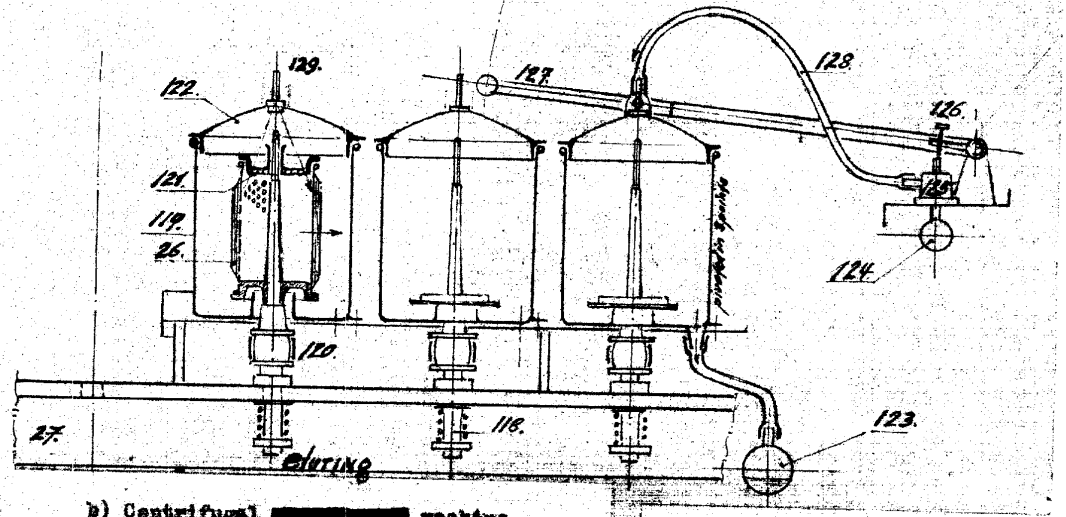
SECRET
SECURITY INFORMATION

NEMEDMER [redacted] MACHINES

ENCL. "F"



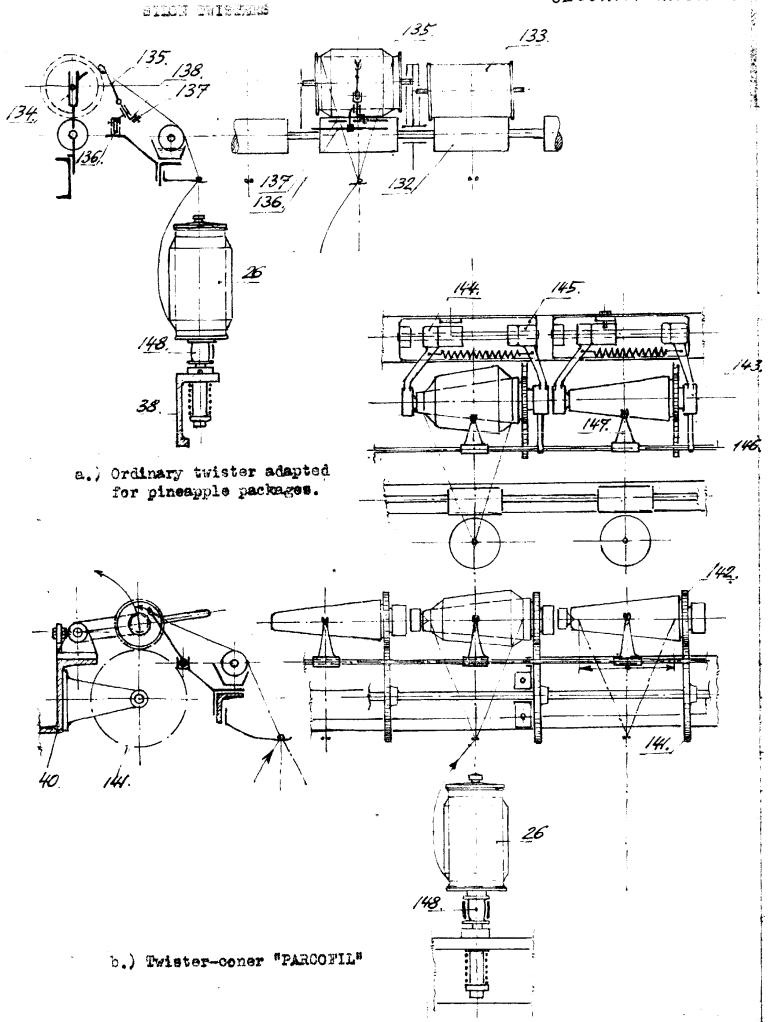
a) Pressure washing machine



b) Centrifugal [redacted] machine

SECRET
SECURITY INFORMATION

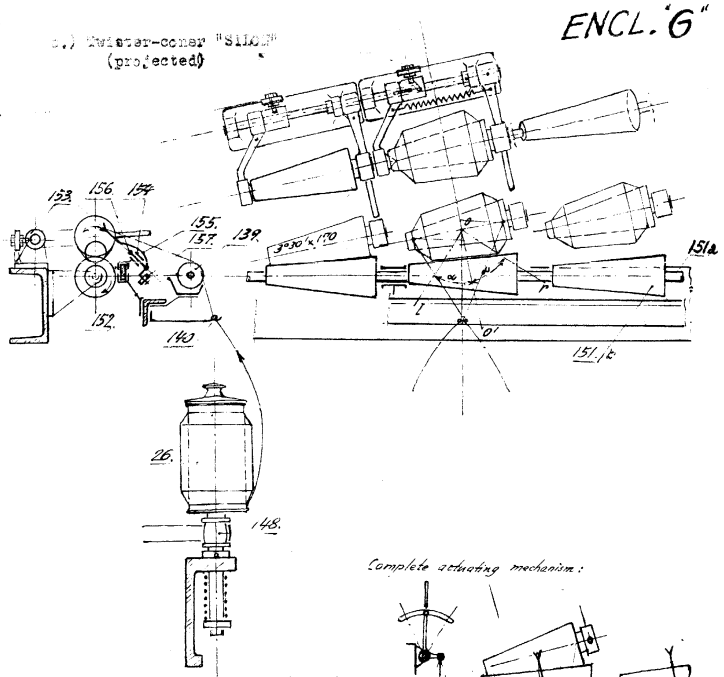
ENCL. "6"



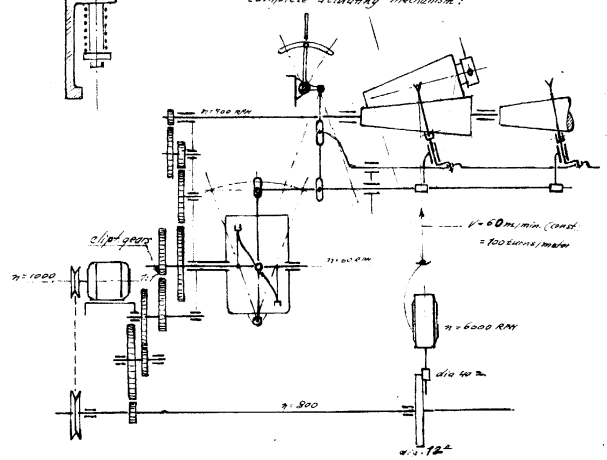
a.) Ordinary twister adapted for pineapple packages.

b.) Twister-coner "PARCOFIL"

c.) Twister-coner "SIRO" (projected)

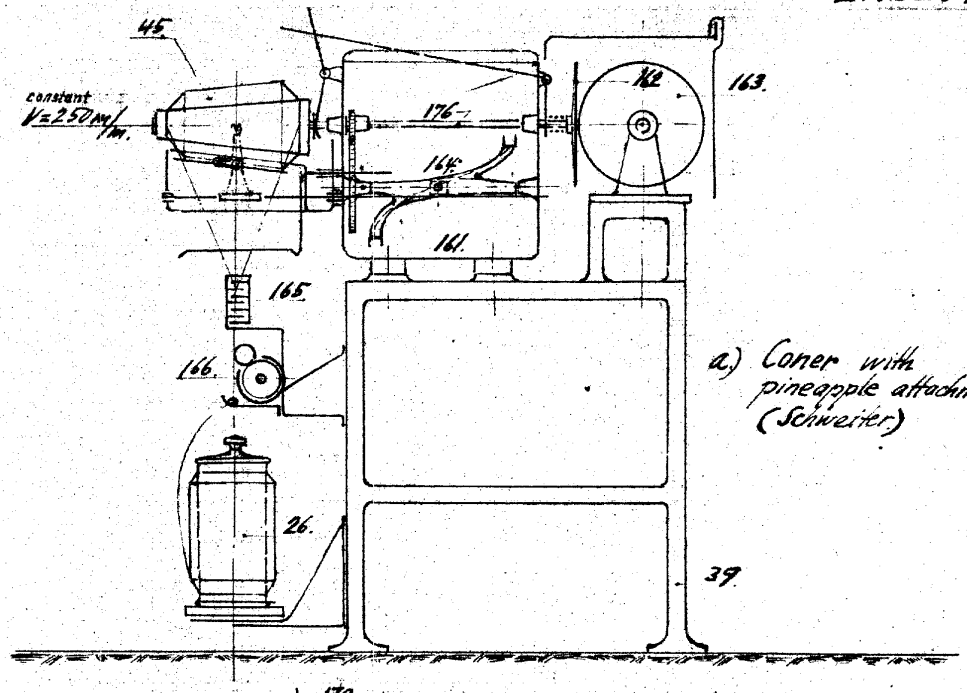


Complete actuating mechanism:

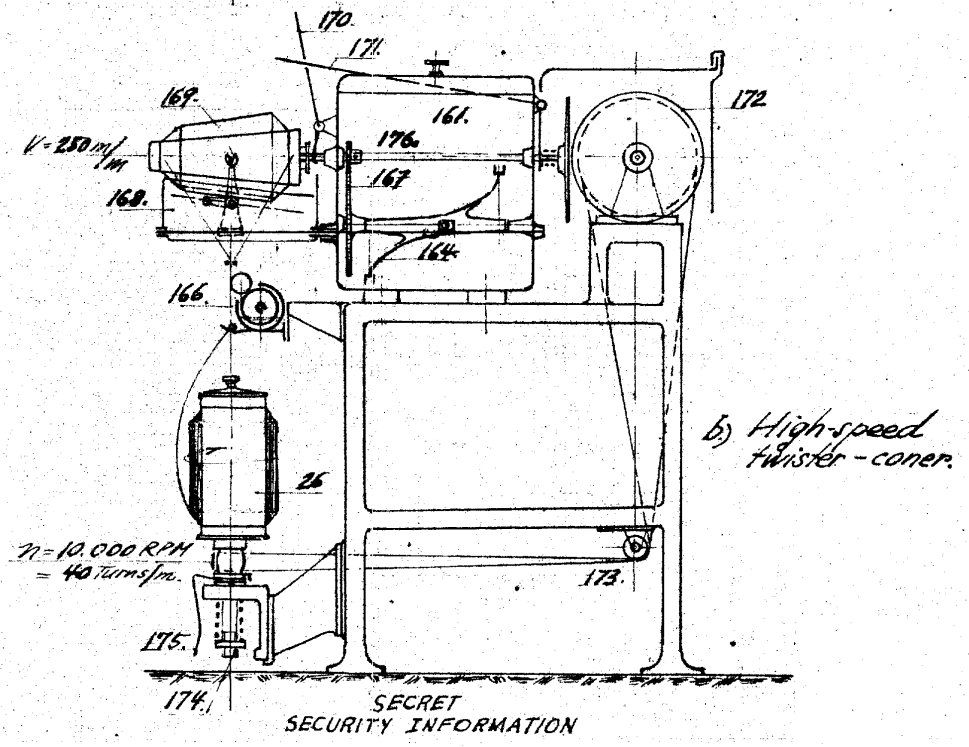


SILON CONER AND HIGH-SPEED TWISTER-CONER

ENCL. "H"



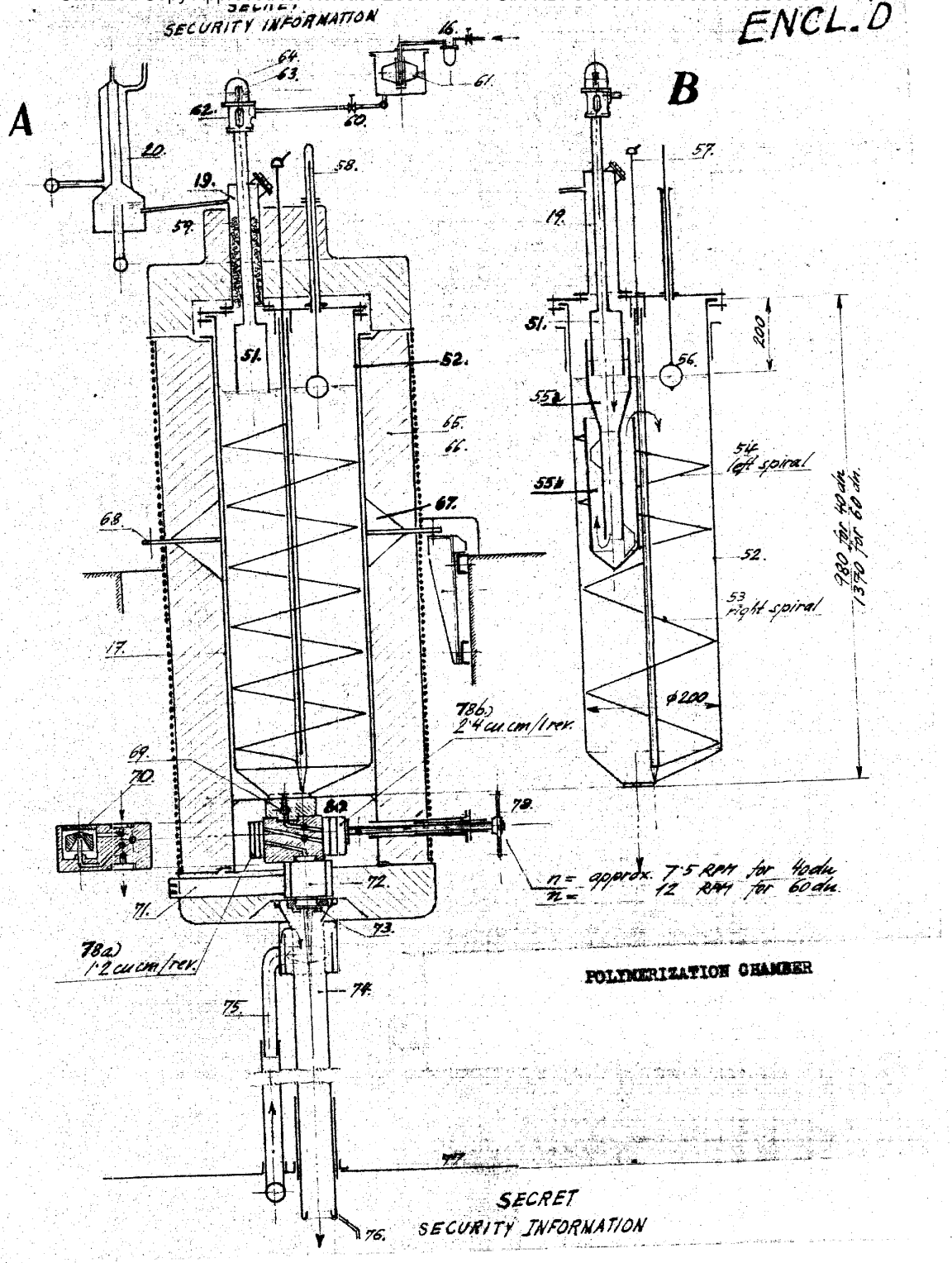
a) Coner with pineapple attachment (Schweiter)



b) High-speed twister-coner.

SECURITY INFORMATION

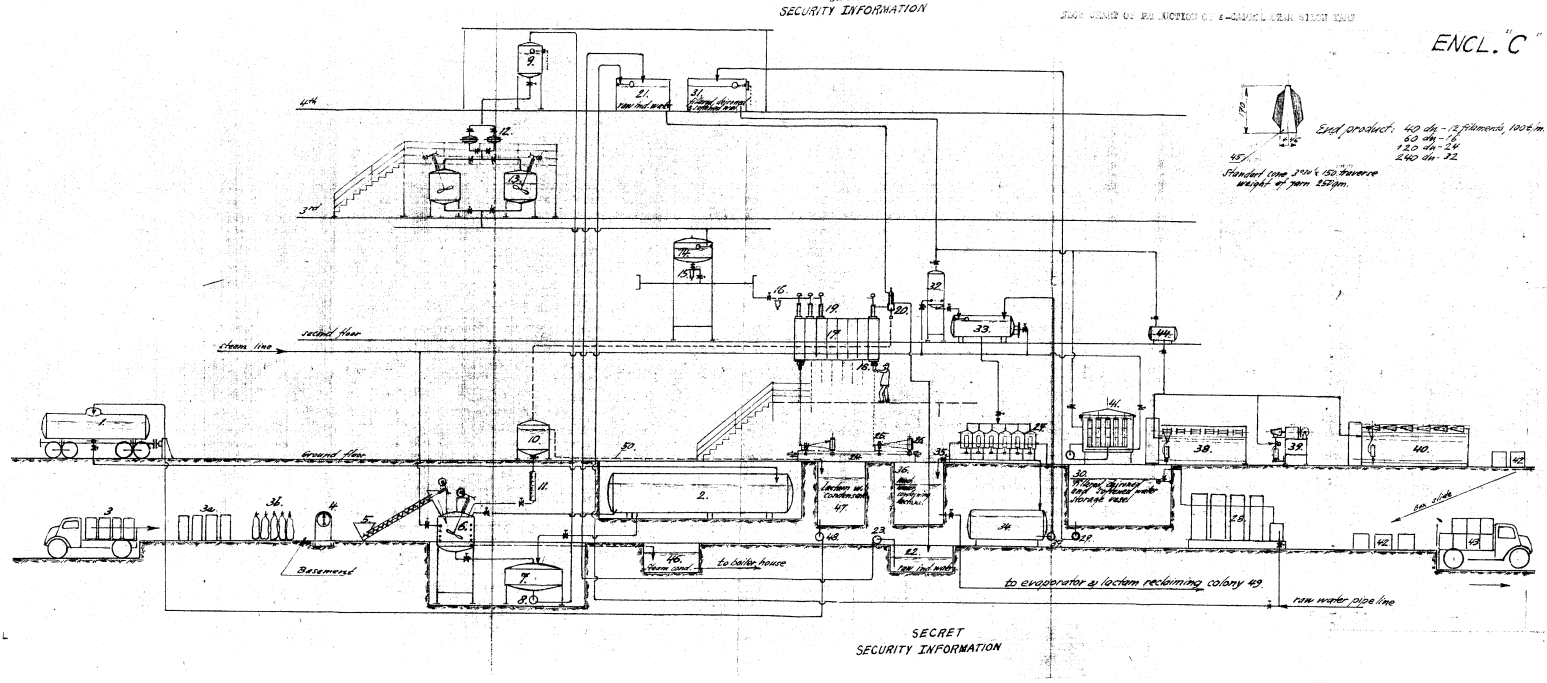
ENCL. "D"



POLYMERIZATION CHAMBER

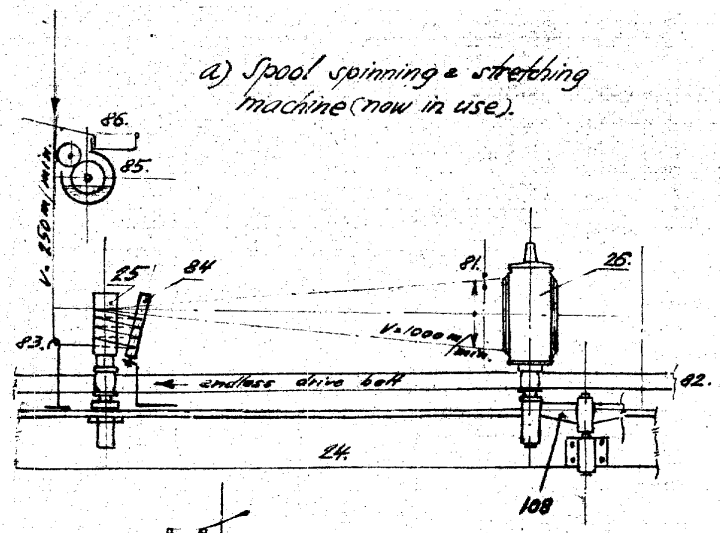
SECRET
SECURITY INFORMATION

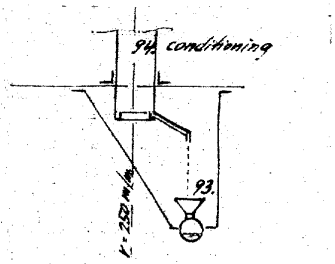
ENCL. "C"

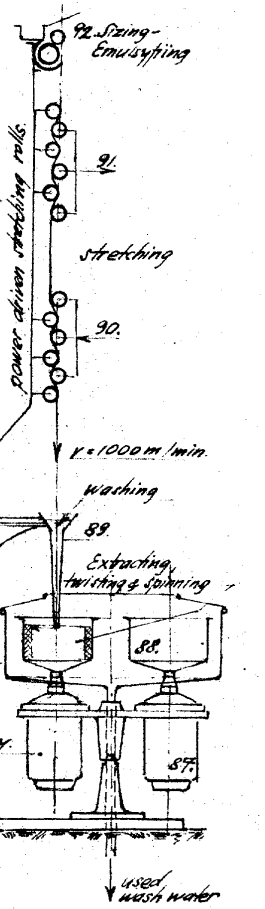


ENCL. "E"

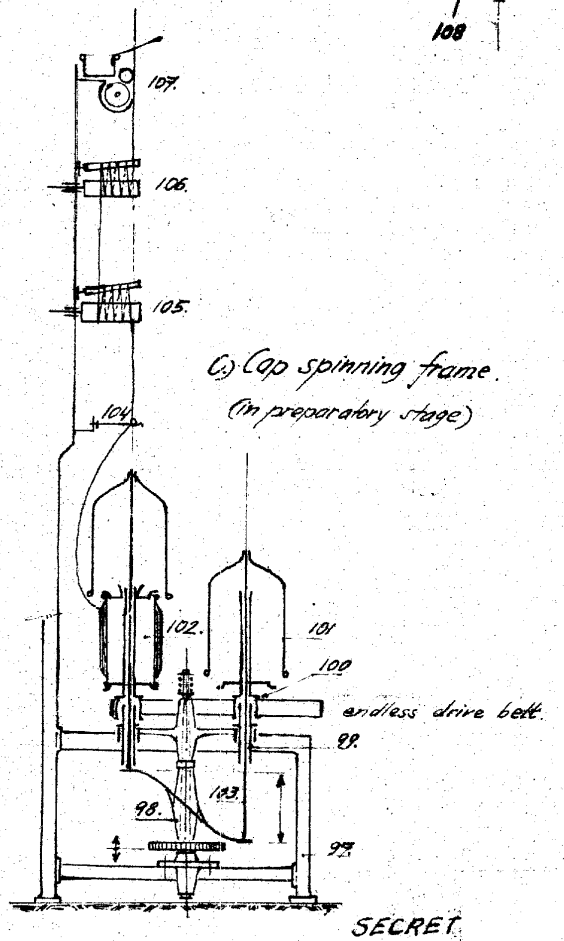
SPINNING AND STRETCHING MACHINERY





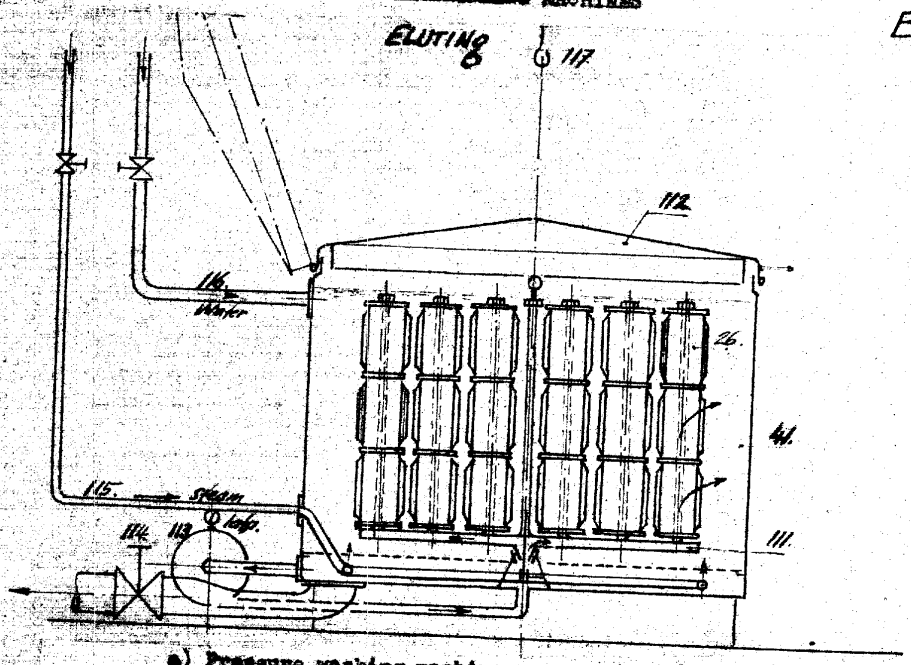


b) Experimental pot spinning machine (being in trial stage)

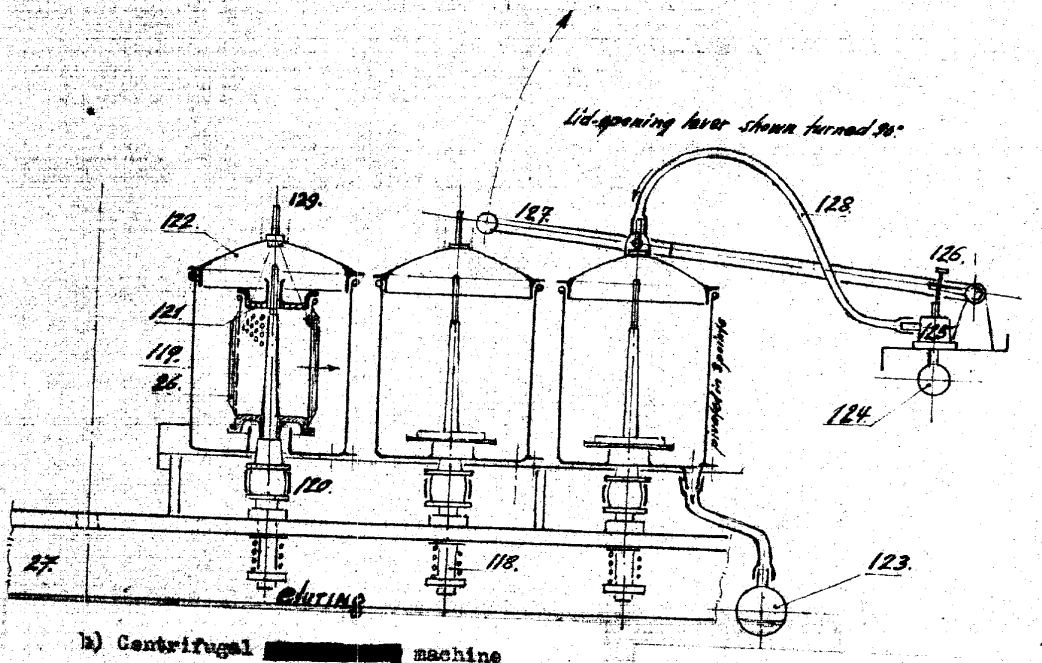


MONOMER [redacted] MACHINES

ENCL. "F"



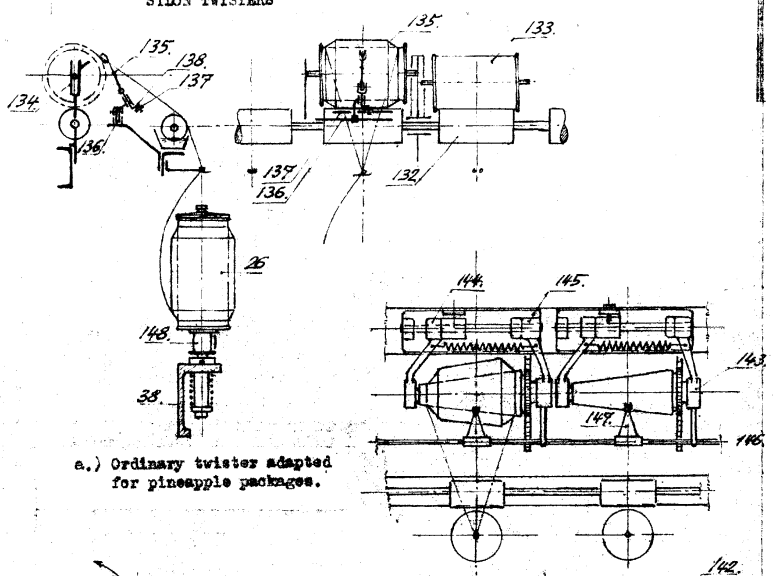
a) Pressure washing machine



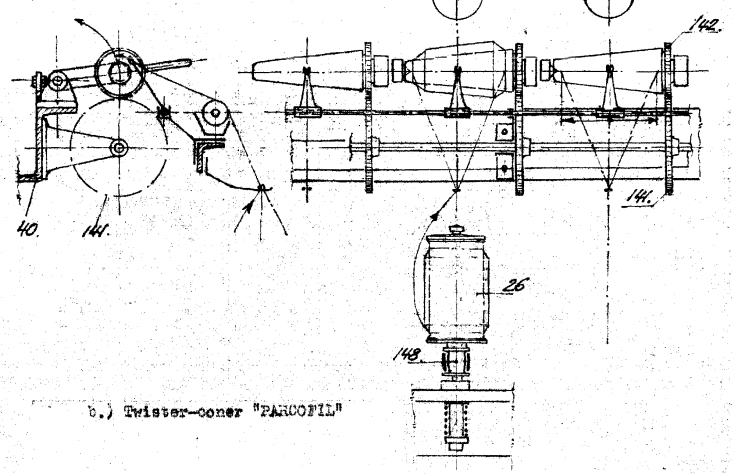
b) Centrifugal [redacted] machine

ENCL. "6"

SILON TWISTERS

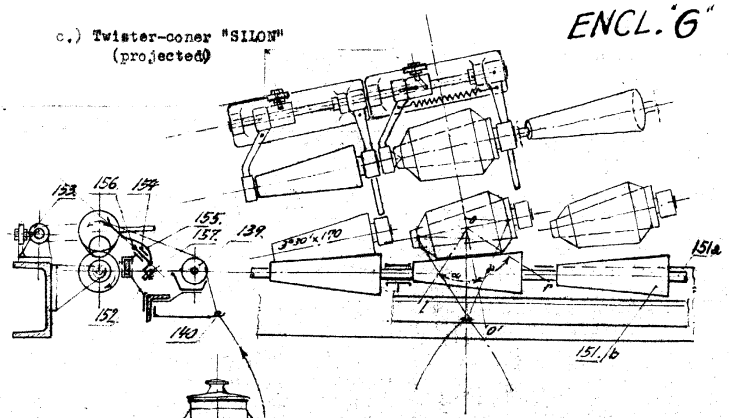


a.) Ordinary twister adapted for pineapple packages.

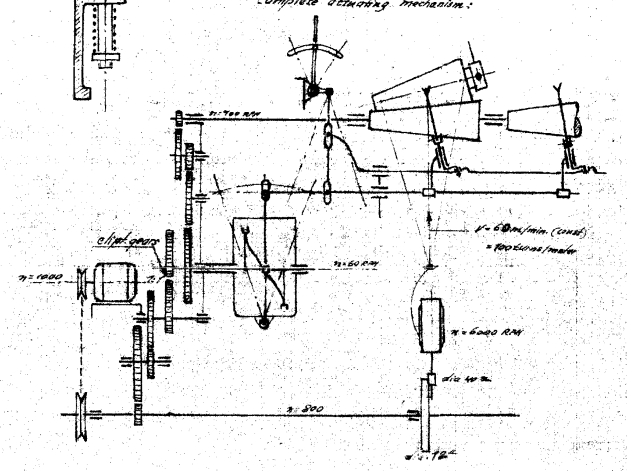


b.) Twister-coner "PARCOFIL"

c.) Twister-coner "SILON" (projected)



Complete actuating mechanism:

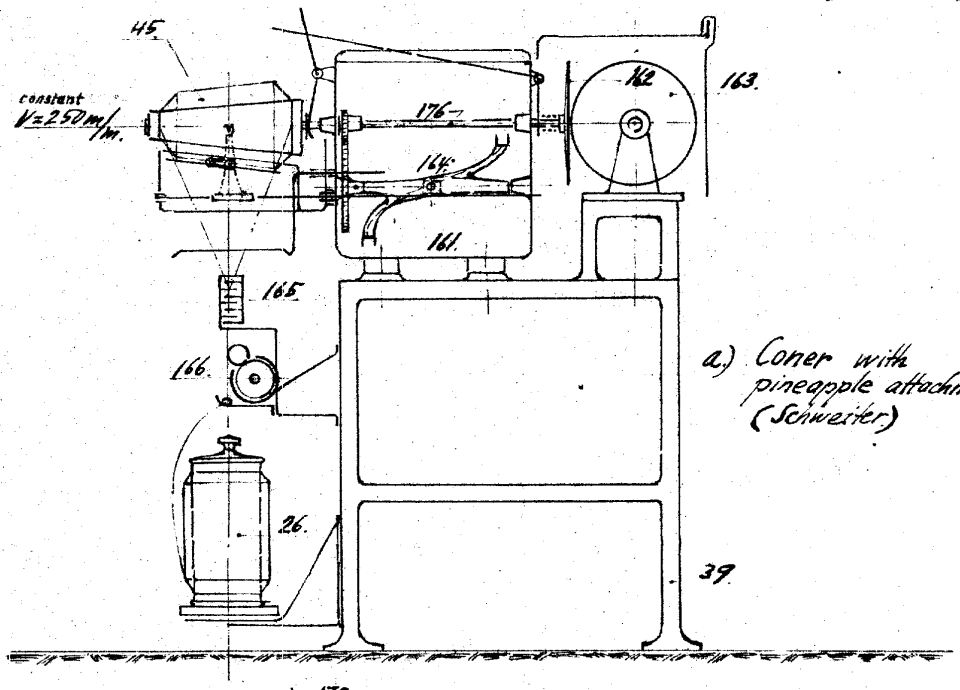


SECRET
SECURITY INFORMATION

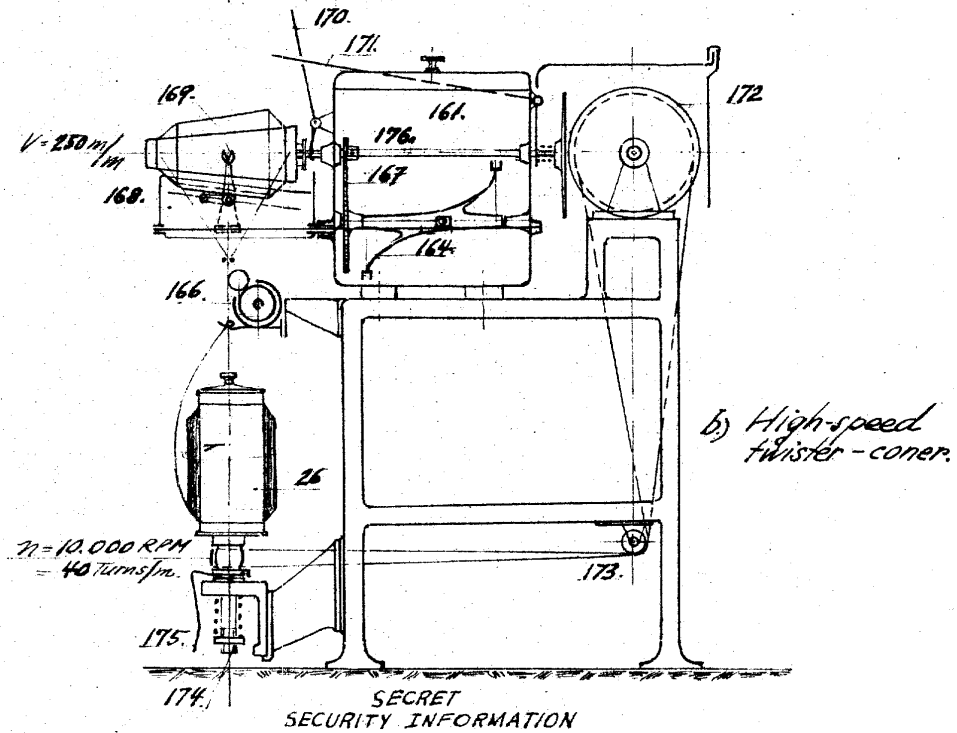
(31-157)

SILON CONER AND HIGH-SPEED TWISTER-CONER

ENCL. "H"



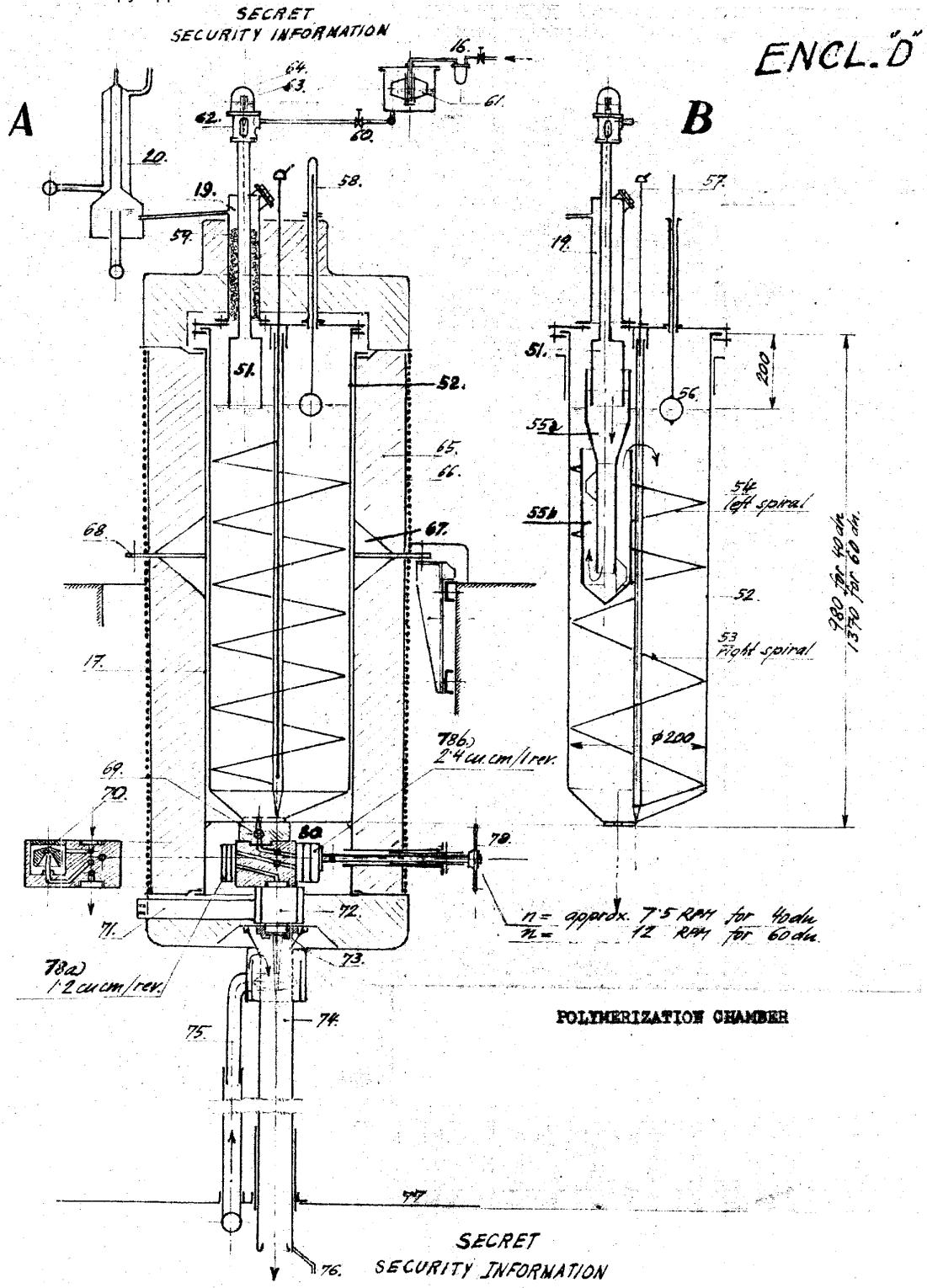
a) Coner with pineapple attachment (Schweiter)



b) High-speed twister-coner.

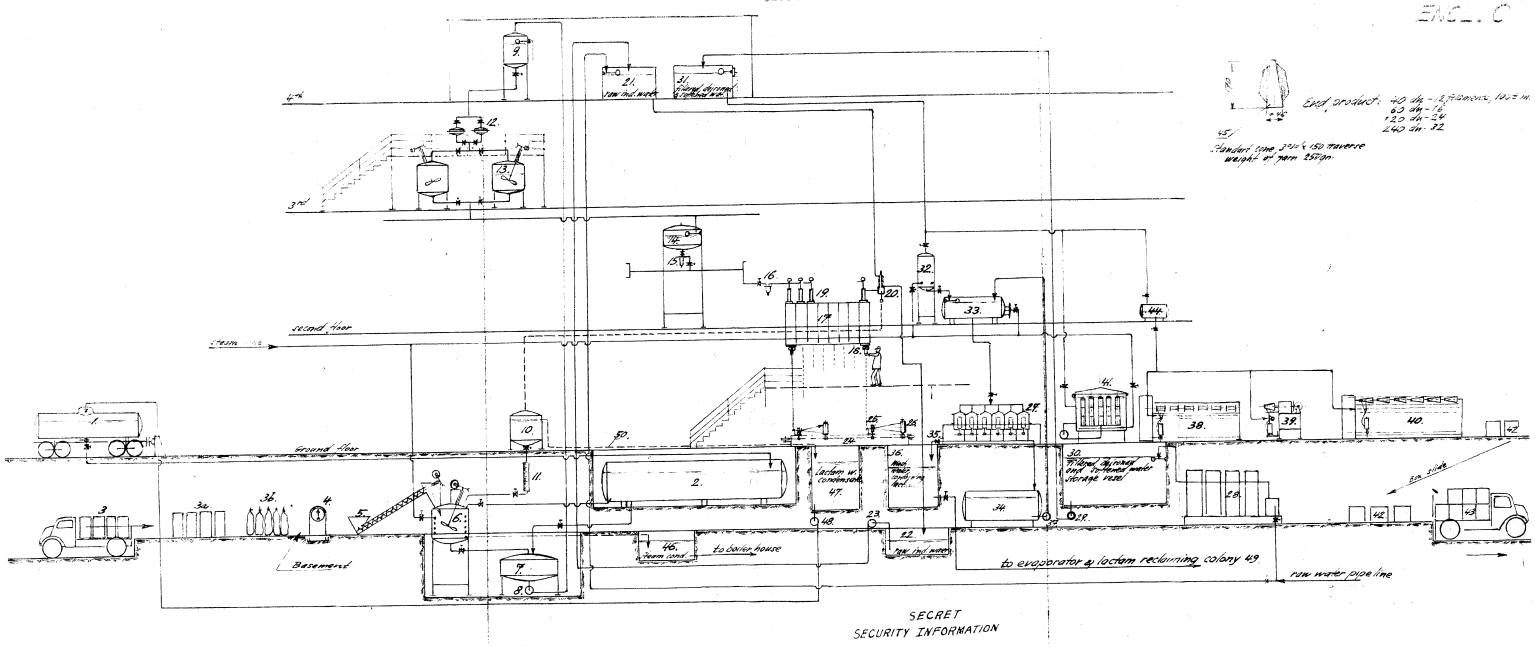
SECRET
SECURITY INFORMATION

ENCL. "D"



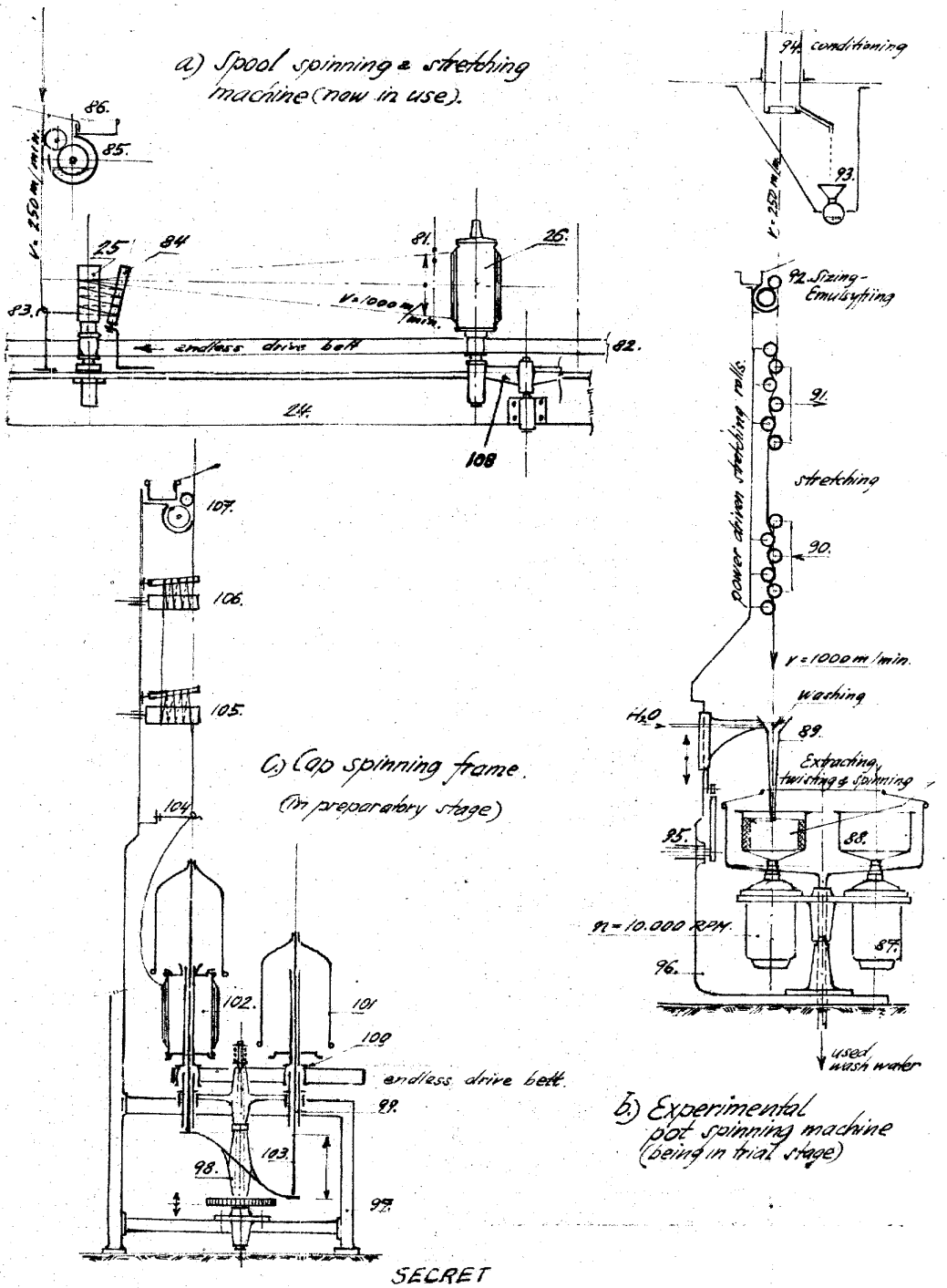
SECRET
SECURITY INFORMATION

ENCL. C



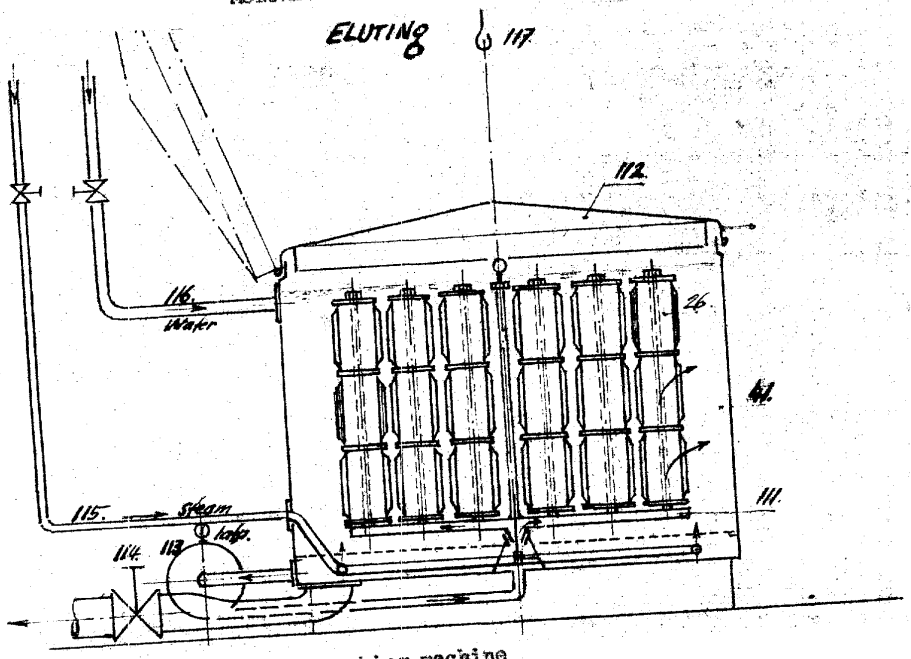
ENCL. "E"

SPINNING AND STRETCHING MACHINERY

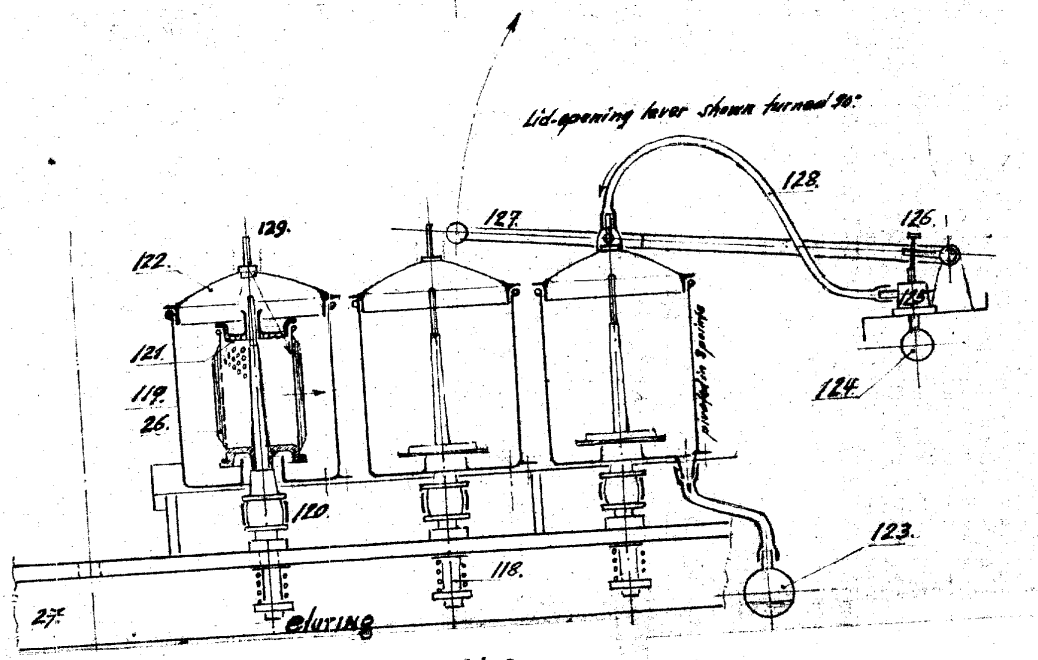


SECRET
SECURITY INFORMATION

ENCL. "F"



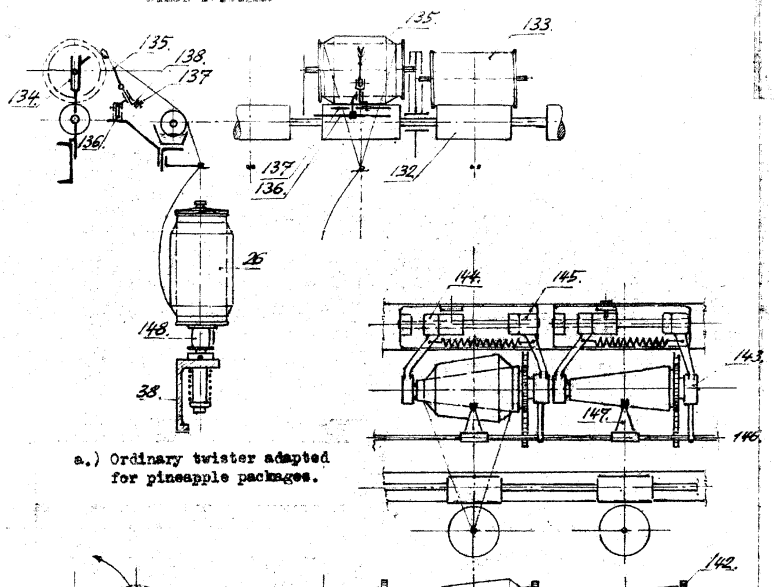
a) Pressure washing machine



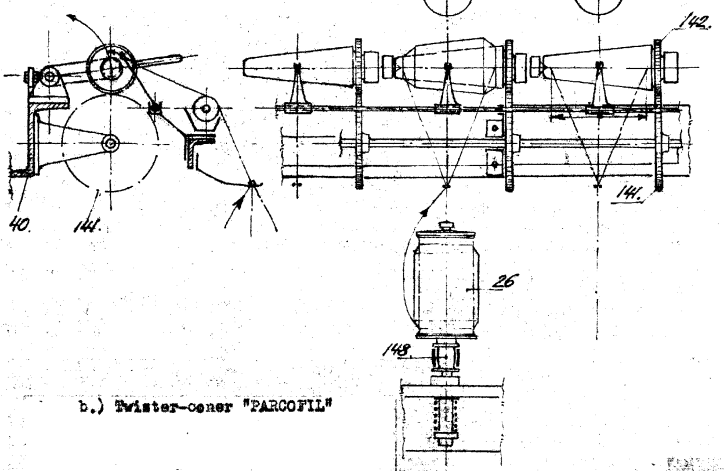
b) Centrifugal [redacted] machine

SECRET
SECURITY INFORMATION

ENCL. "6"

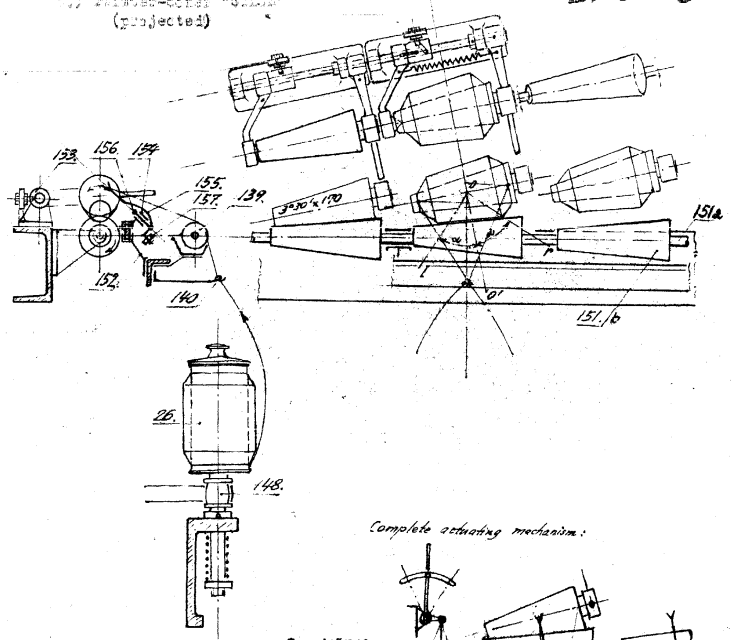


a.) Ordinary twister adapted for pineapple packages.

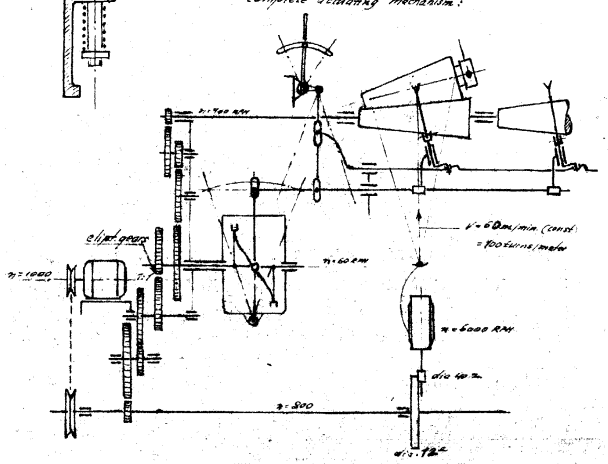


b.) Twister-coner "PARCOFIL"

(projected)



Complete actuating mechanism:



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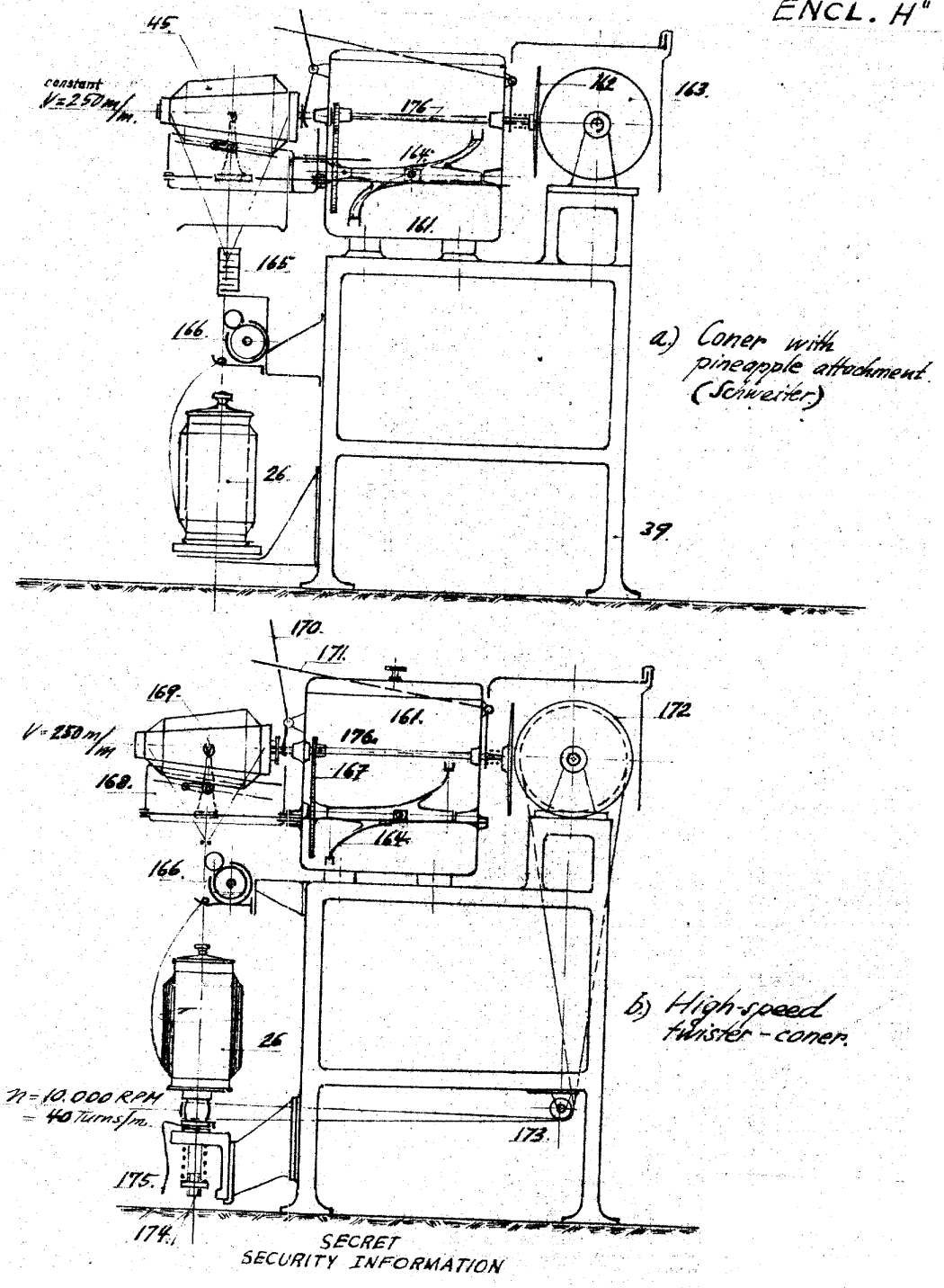
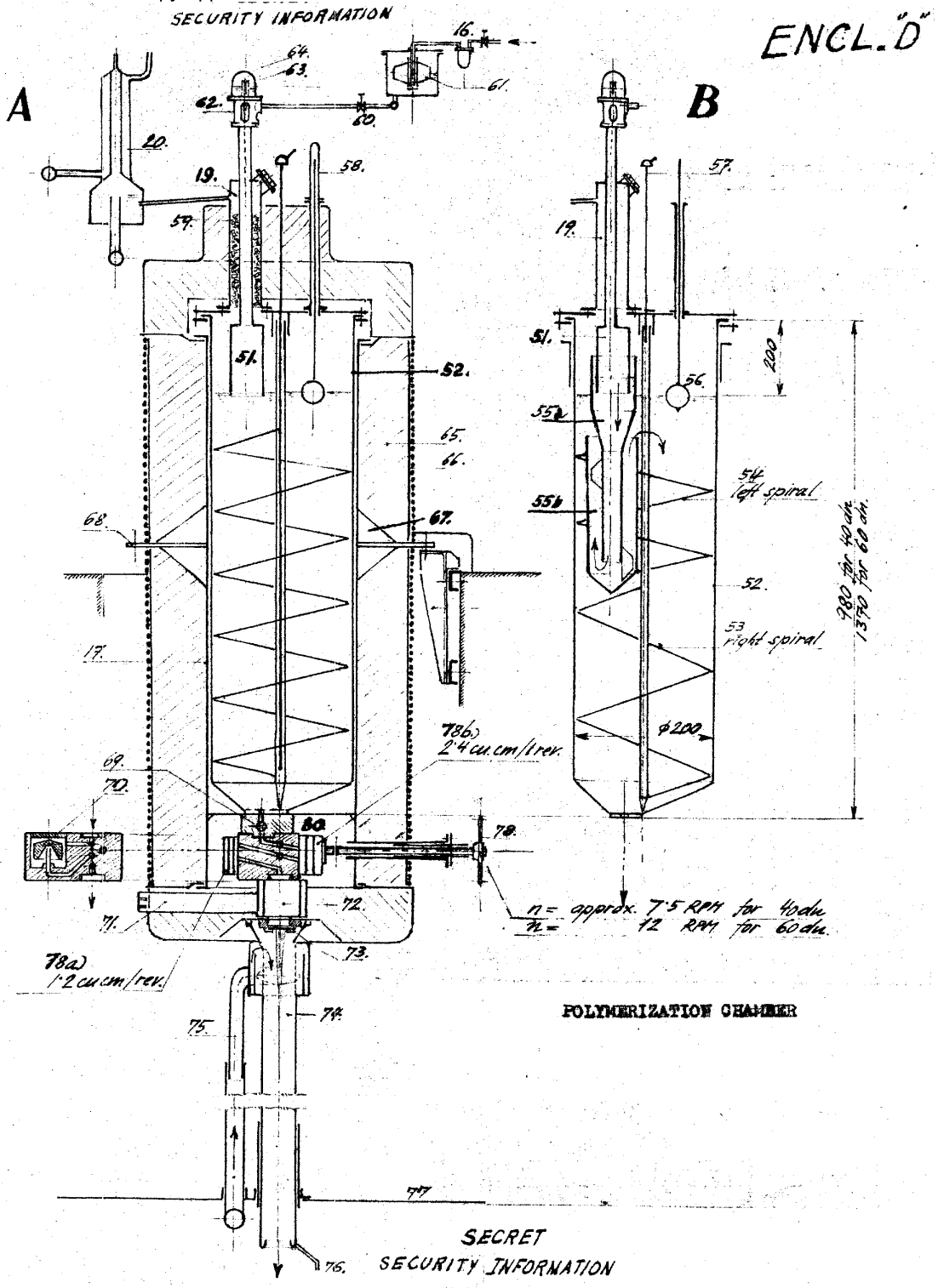
SILOT CONER AND HIGH-SPEED TWISTER-CONER

ENCL. "H"



SECURITY INFORMATION

ENCL. "D"



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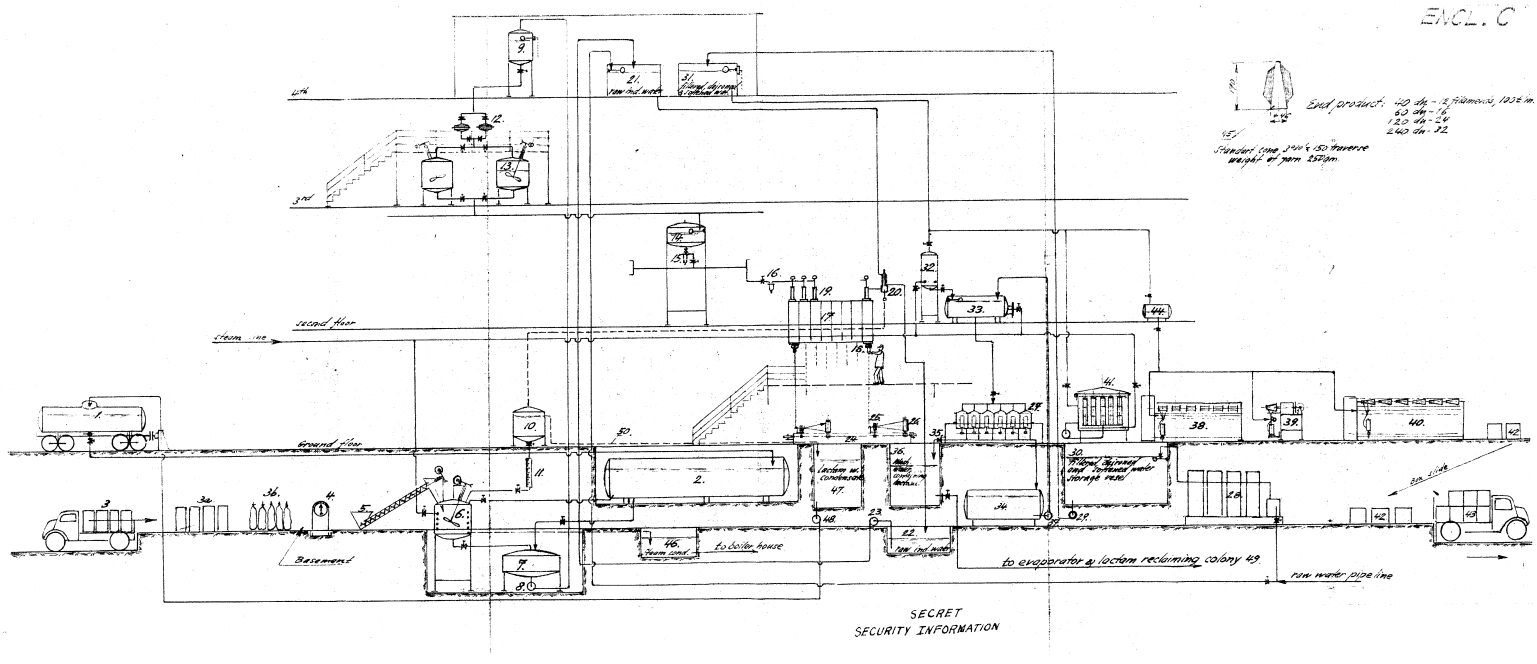
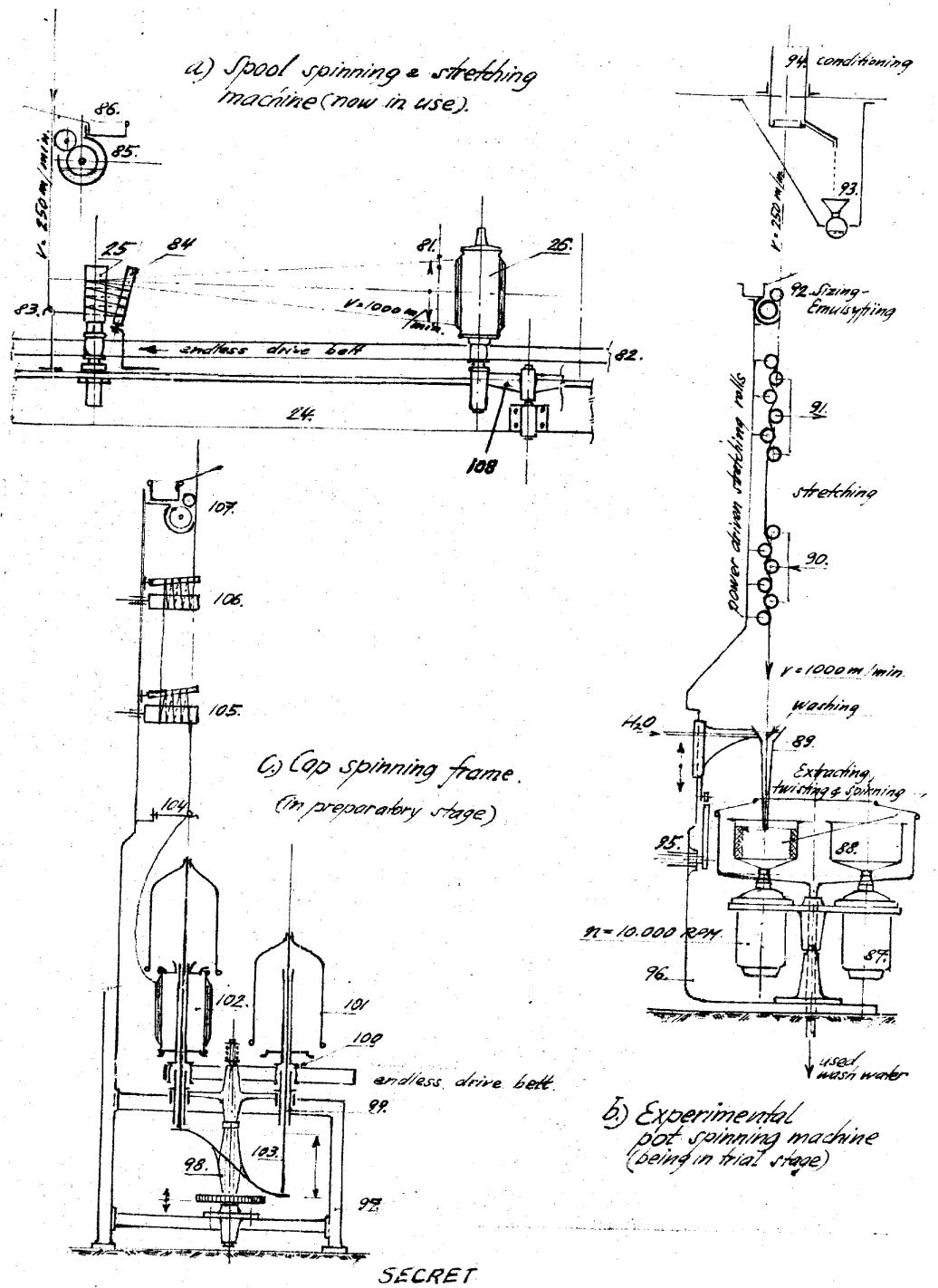
ENCL. C



SECRET
SECURITY INFORMATION

ENCL. "E"

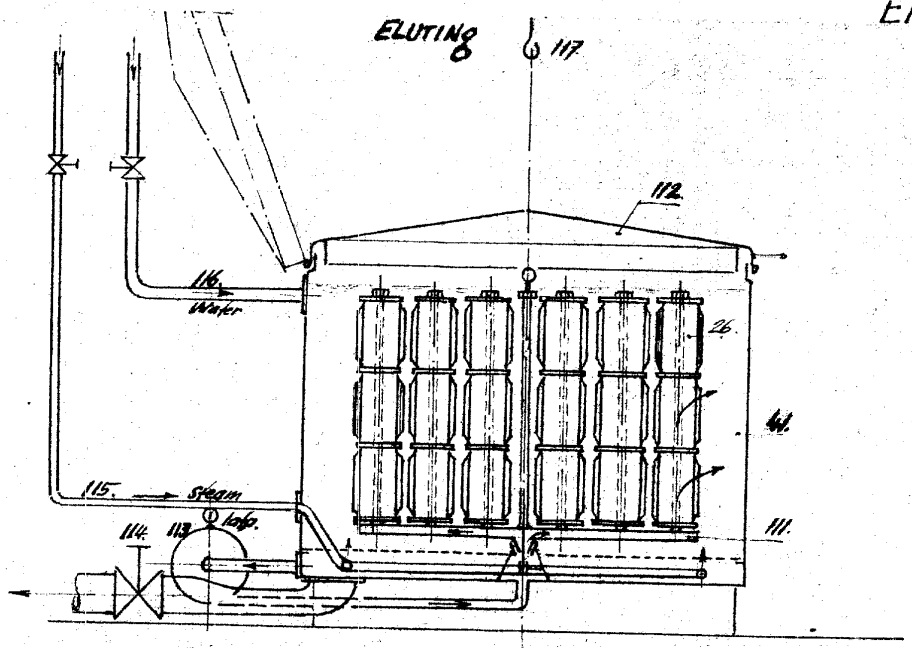
SPINNING AND STRETCHING MACHINERY



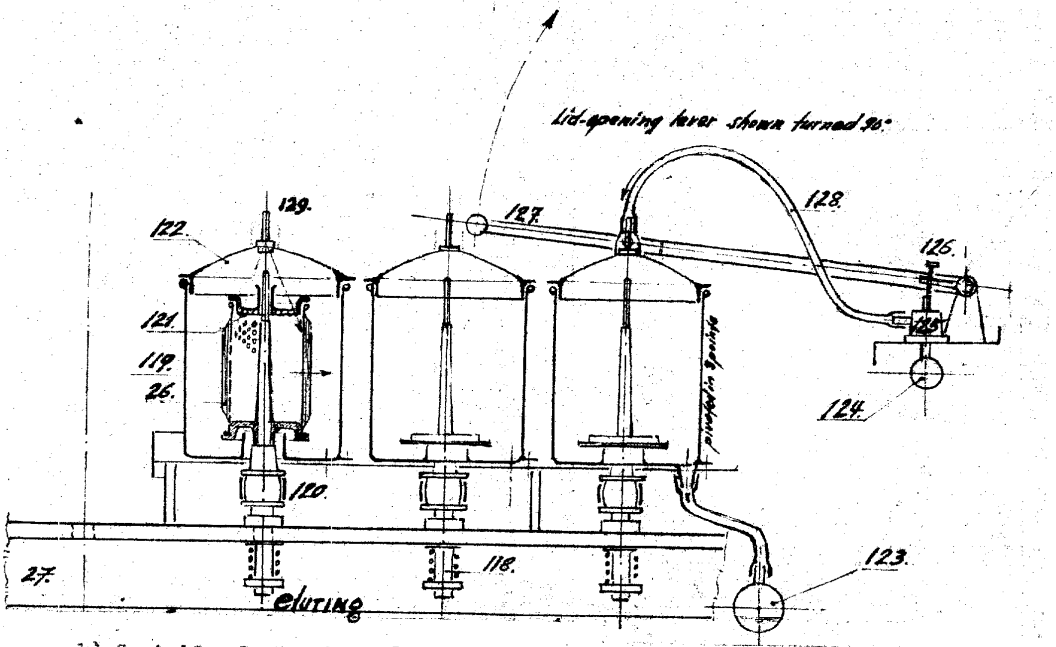
SECRET
SECURITY INFORMATION

[redacted] MACHINES

ENCL. "F"



a) Pressure washing machine



b) Centrifugal [redacted] machine

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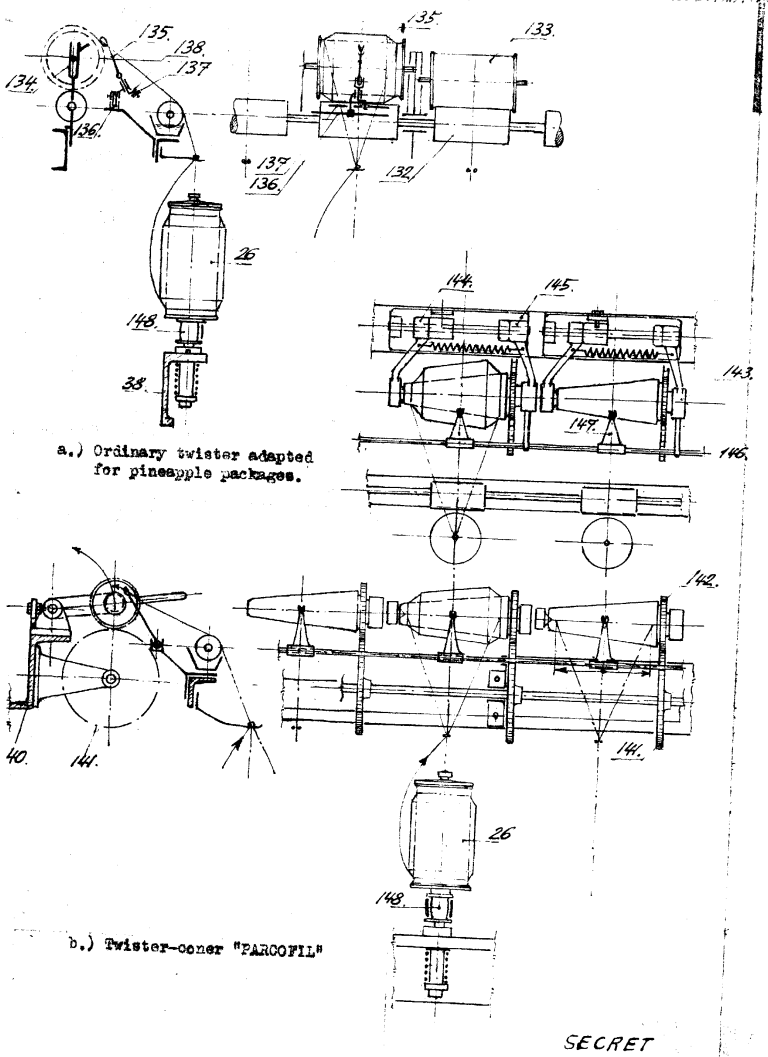
SECURITY INFORMATION

SILOS EXISTENS

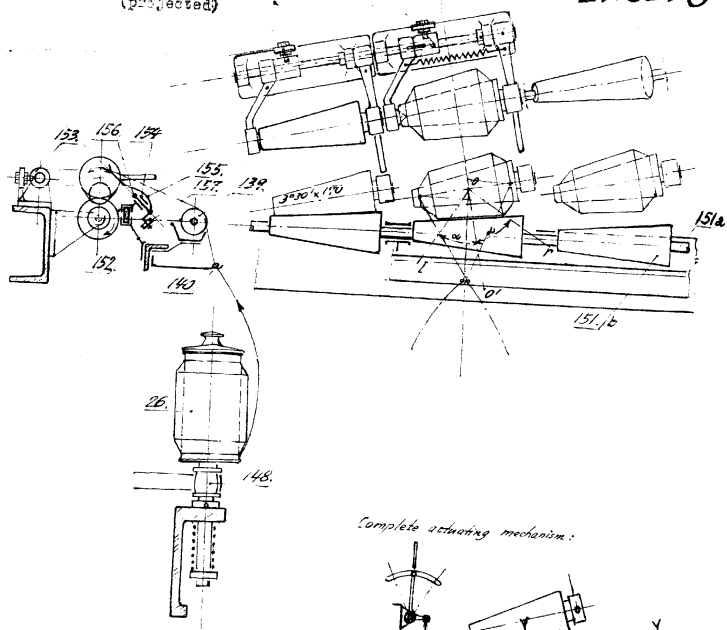


a.) Ordinary twister adapted for pineapple packages.

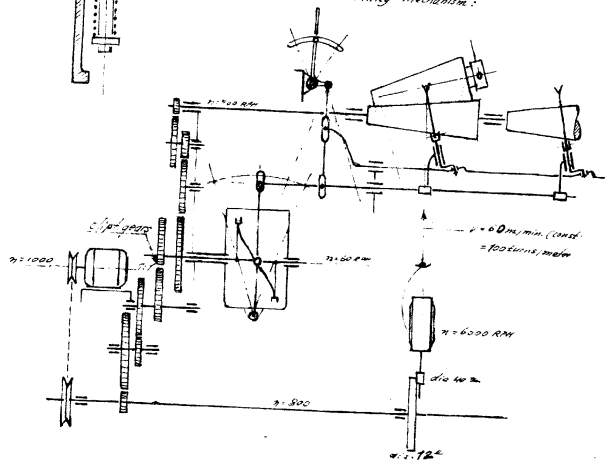
b.) Twister-coner "PARCOFIL"

c.) Twister-coner "SILOS" (projected)

ENCL. "G"



Complete actuating mechanism:



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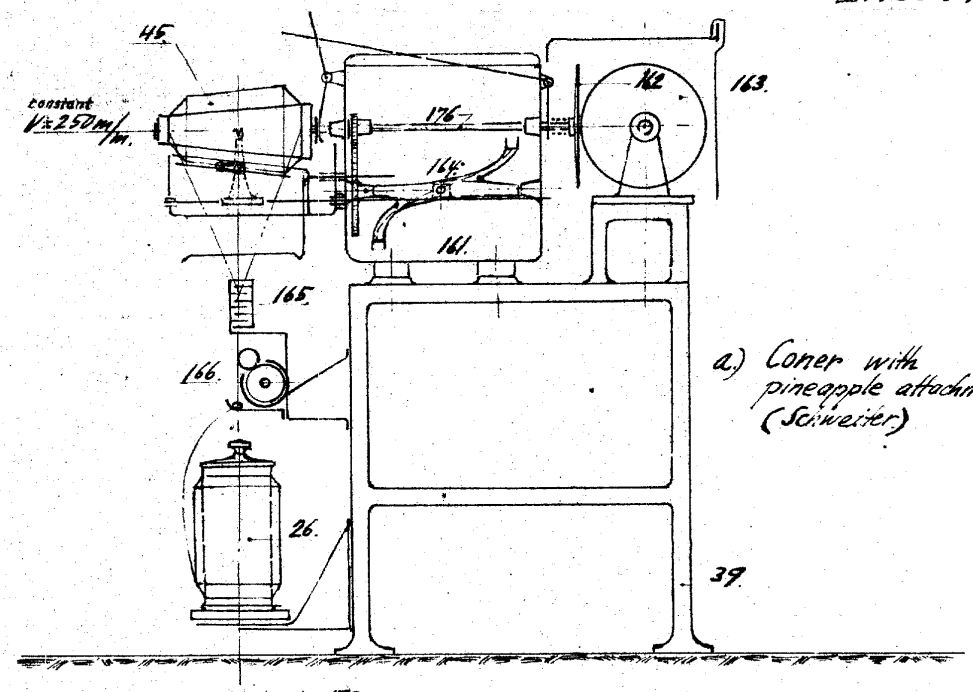
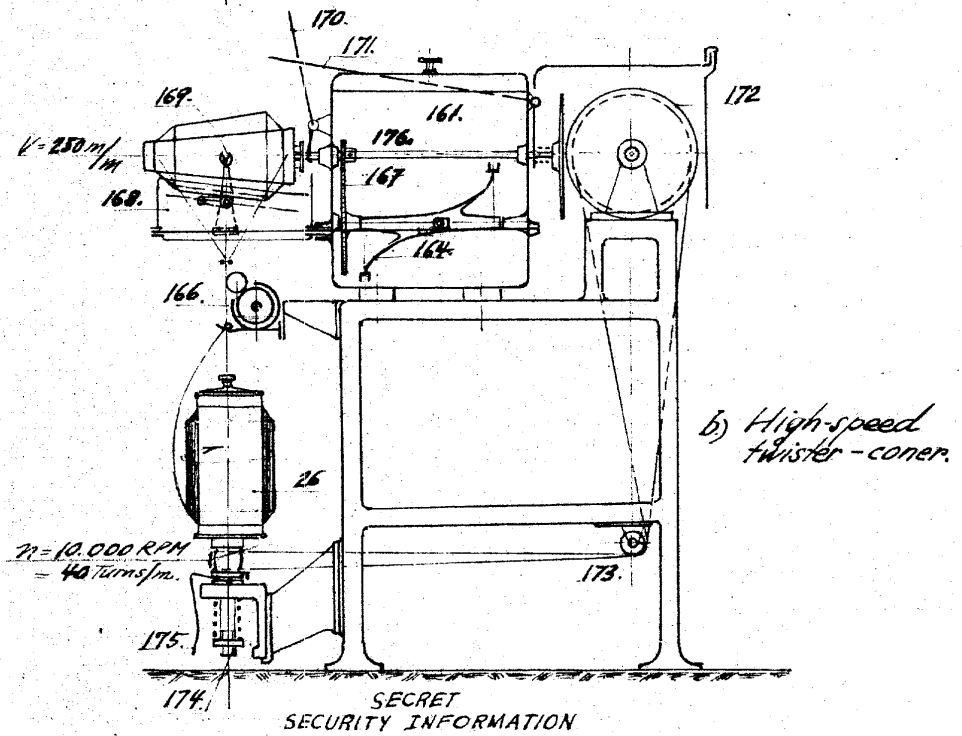
SECURITY INFOMATION

SILON CONER AND HIGH-SPEED TWISTER-CONER

ENCL. "H"



a) Coner with pineapple attachment. (Schweiter)



b) High-speed twister-coner.

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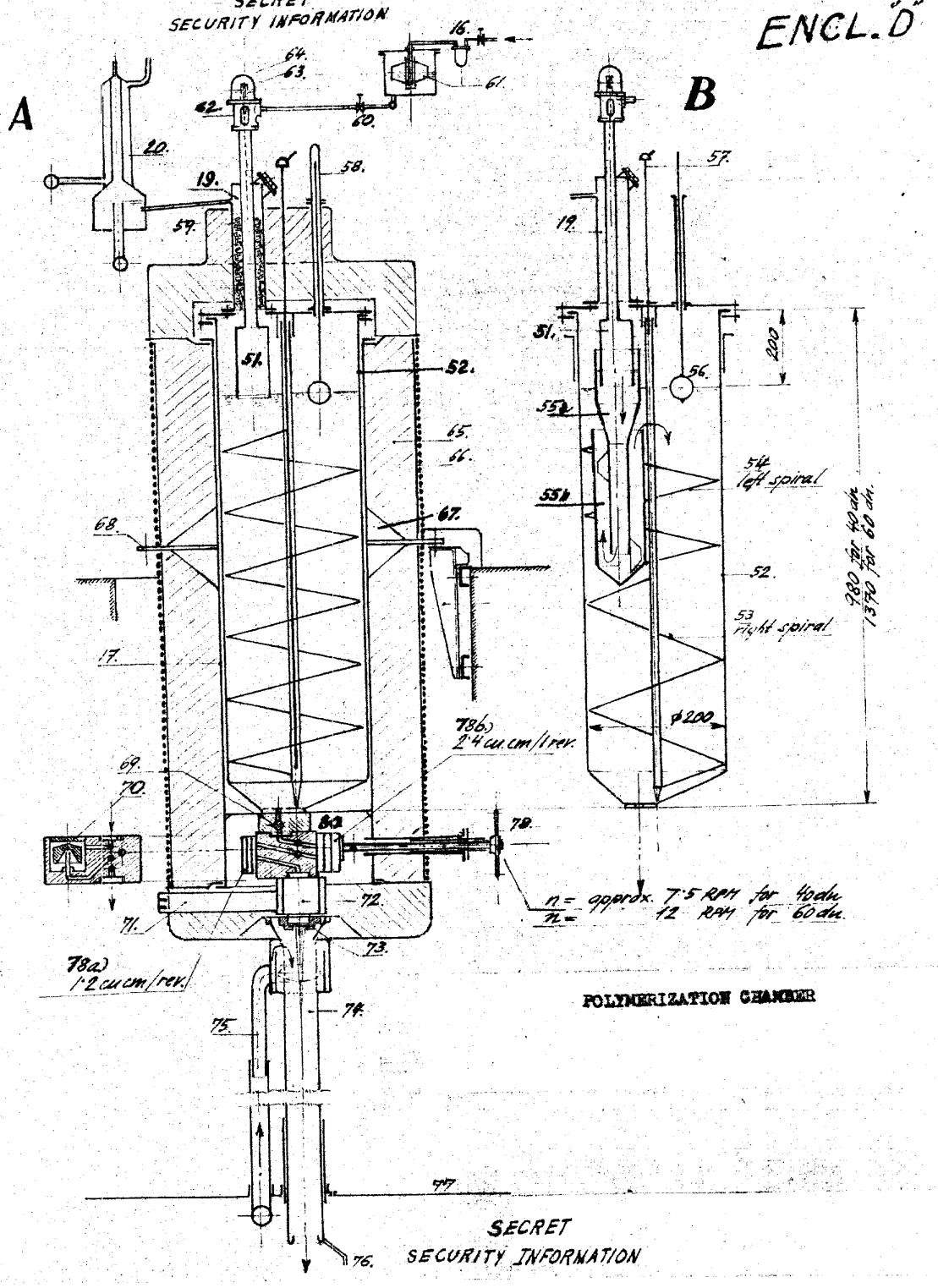
ENCL. "D"



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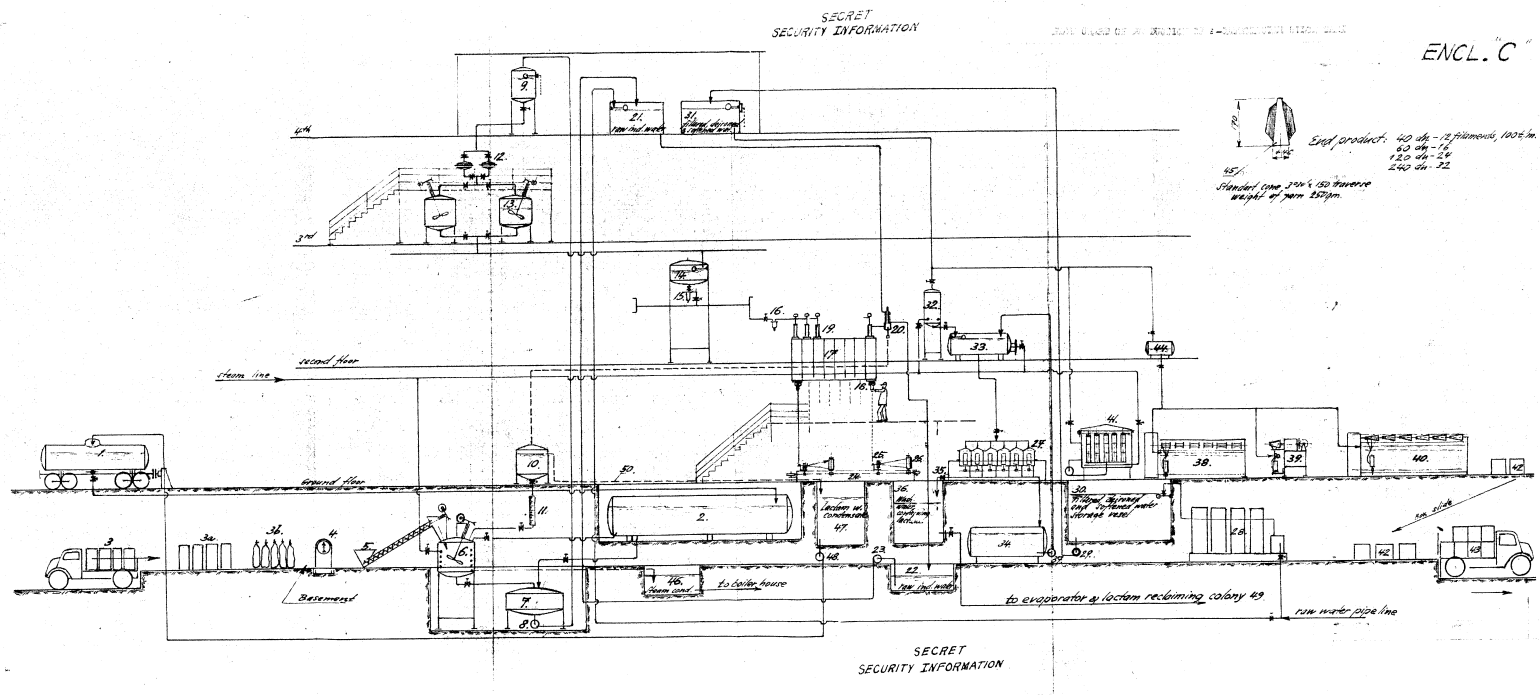
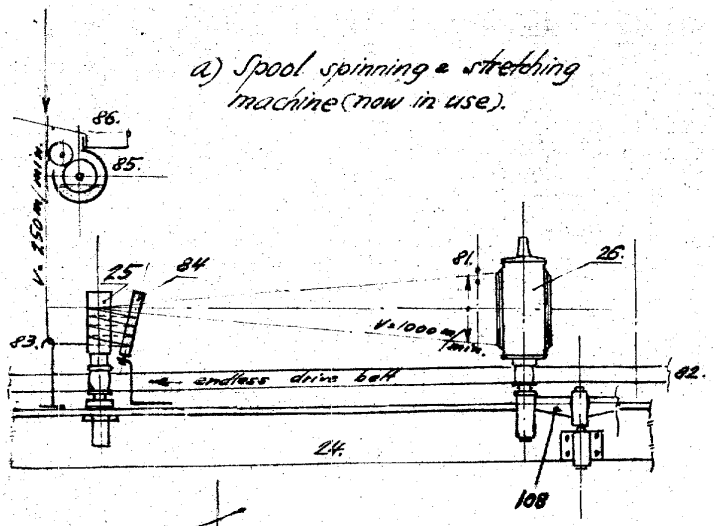
ENCL. "C"

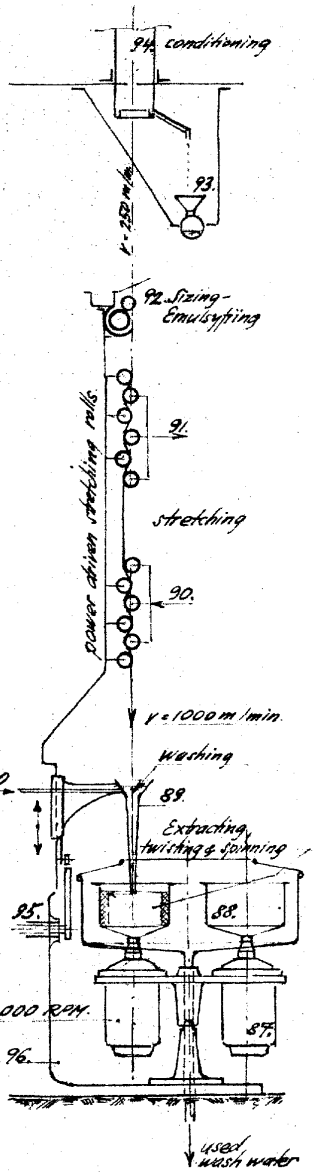


SECRET
SECURITY INFORMATION

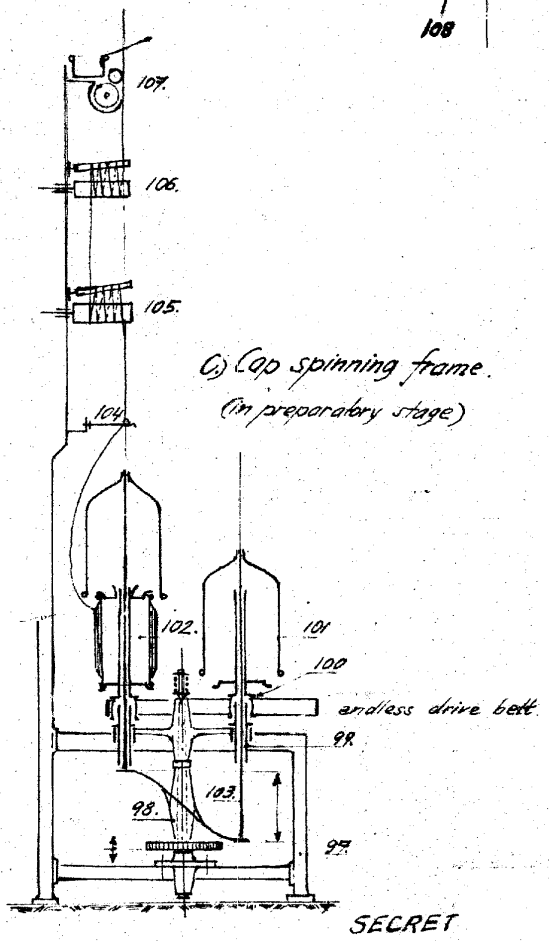
ENCL. "E"

SPINNING AND STRETCHING MACHINERY





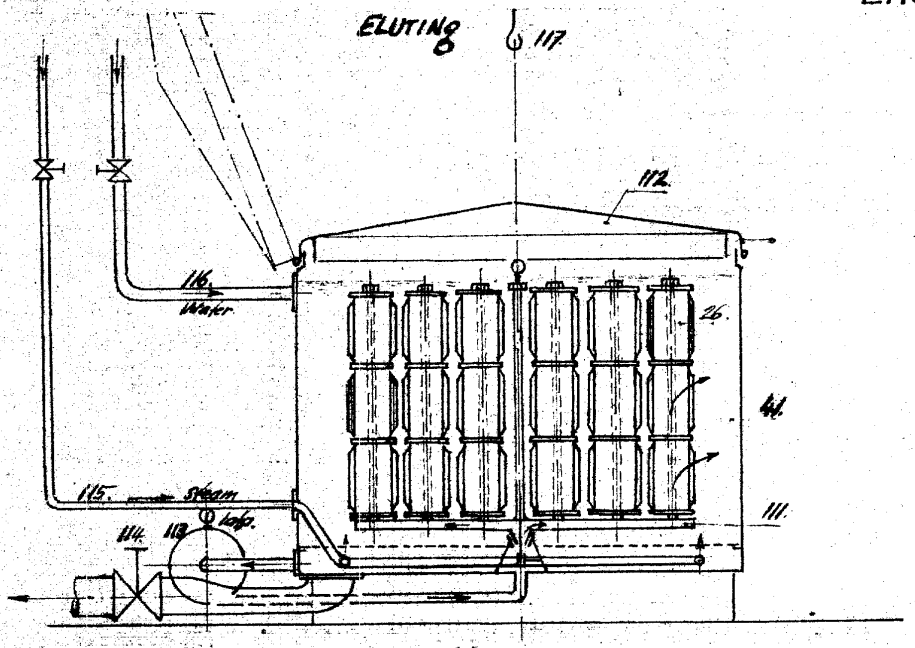
b) Experimental pot spinning machine (being in trial stage)



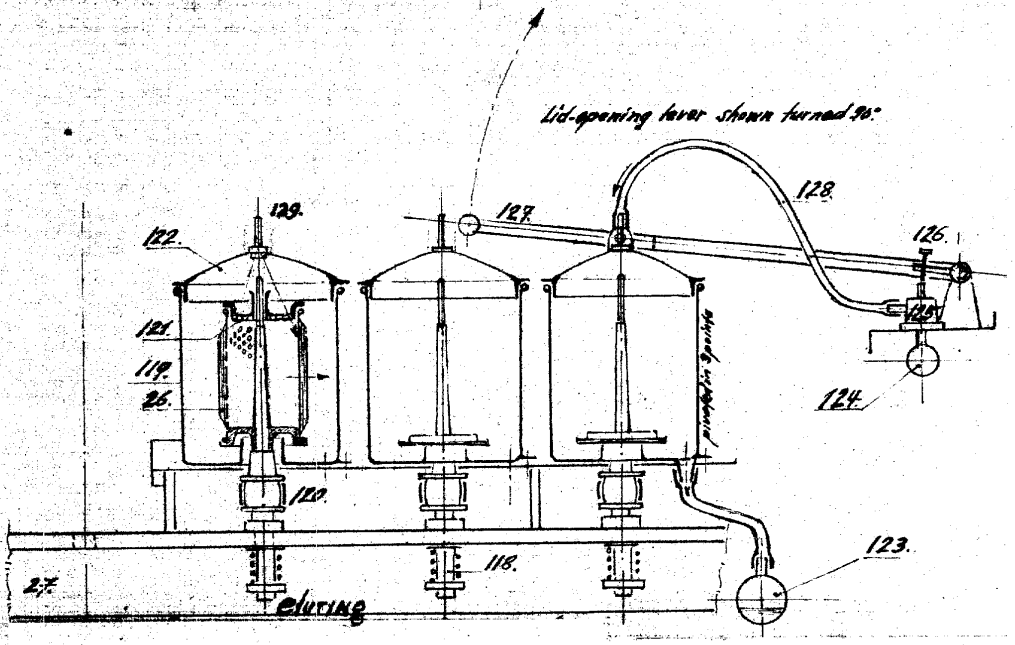
SECRET
SECURITY INFORMATION

MONOMER [redacted] MACHINES

ENCL. "F"



a) Pressure washing machine

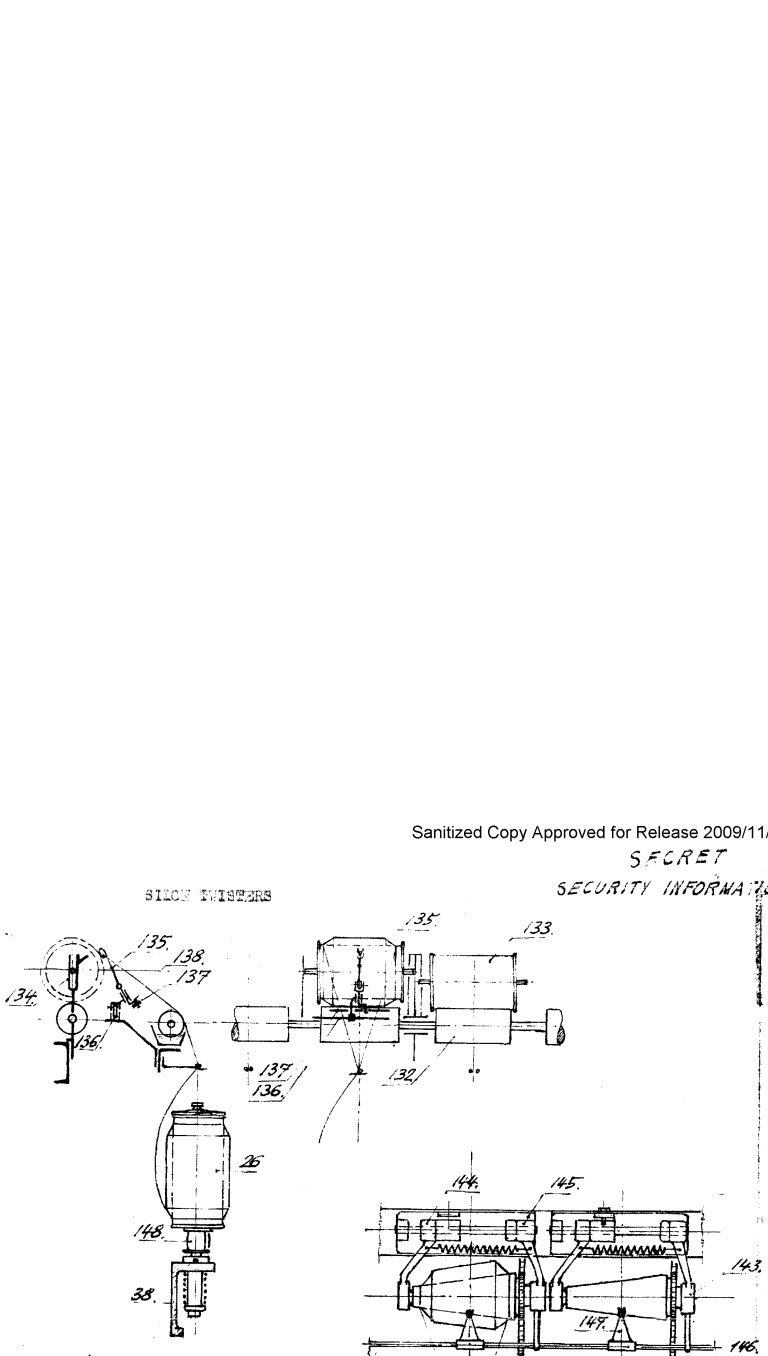


b) Centrifugal [redacted] machine

SECRET
SECURITY INFORMATION

ENCL. "6"

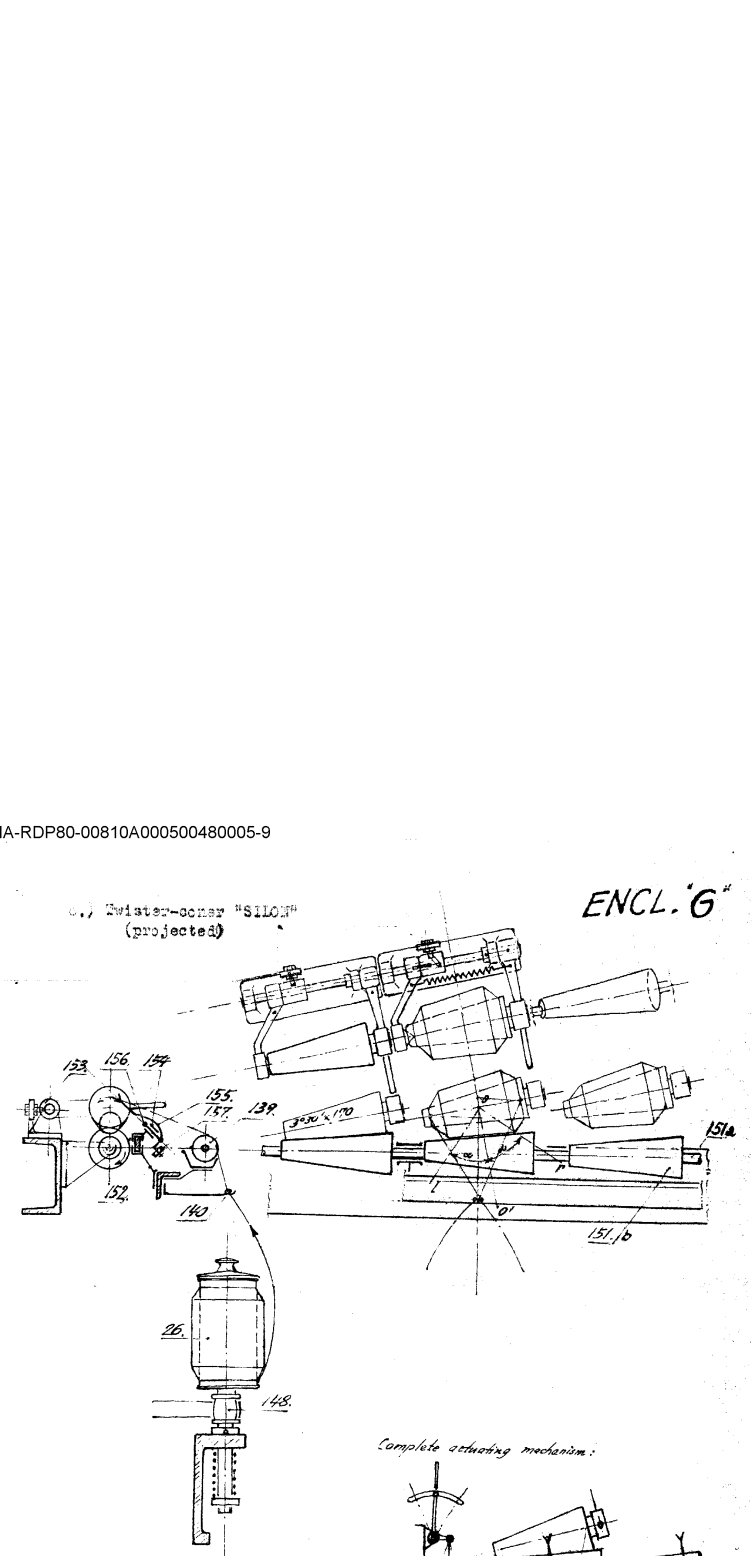
SILON TWISTERS



a.) Ordinary twister adapted for pineapple packages.

b.) Twister-coner "PARCOFIL"

c.) Twister-coner "SILON" (projected)



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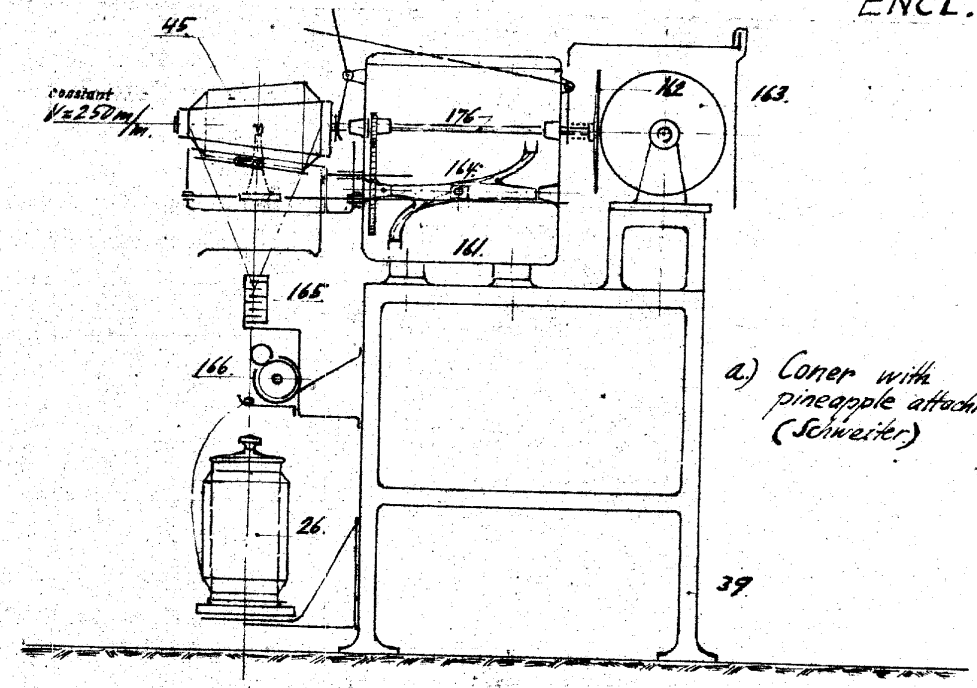
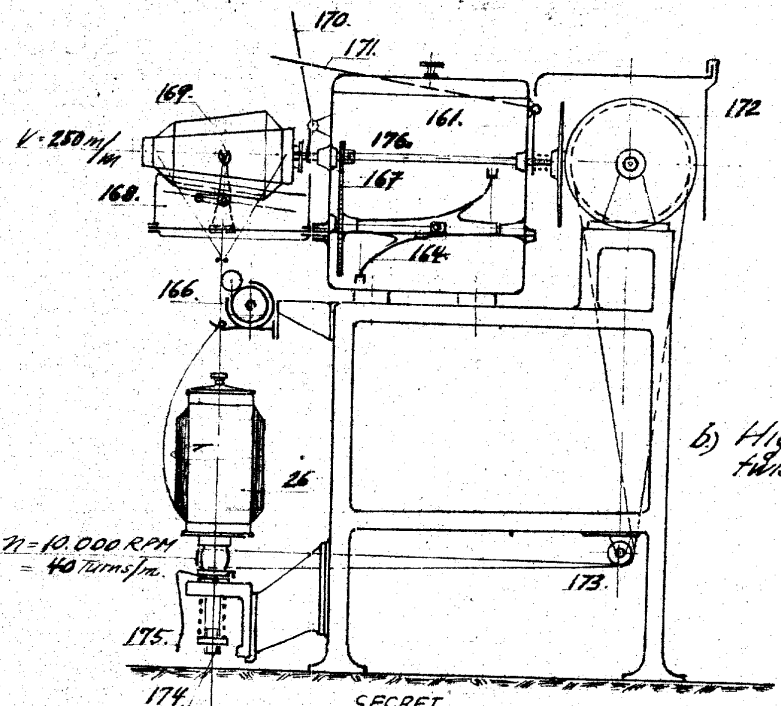
SECURITY INFOMATION

ENCL. "H"

SILON CONER AND HIGH-SPEED TWISTER-CONER



a.) Coner with pineapple attachment (Schweiter)



b.) High-speed twister-coner.

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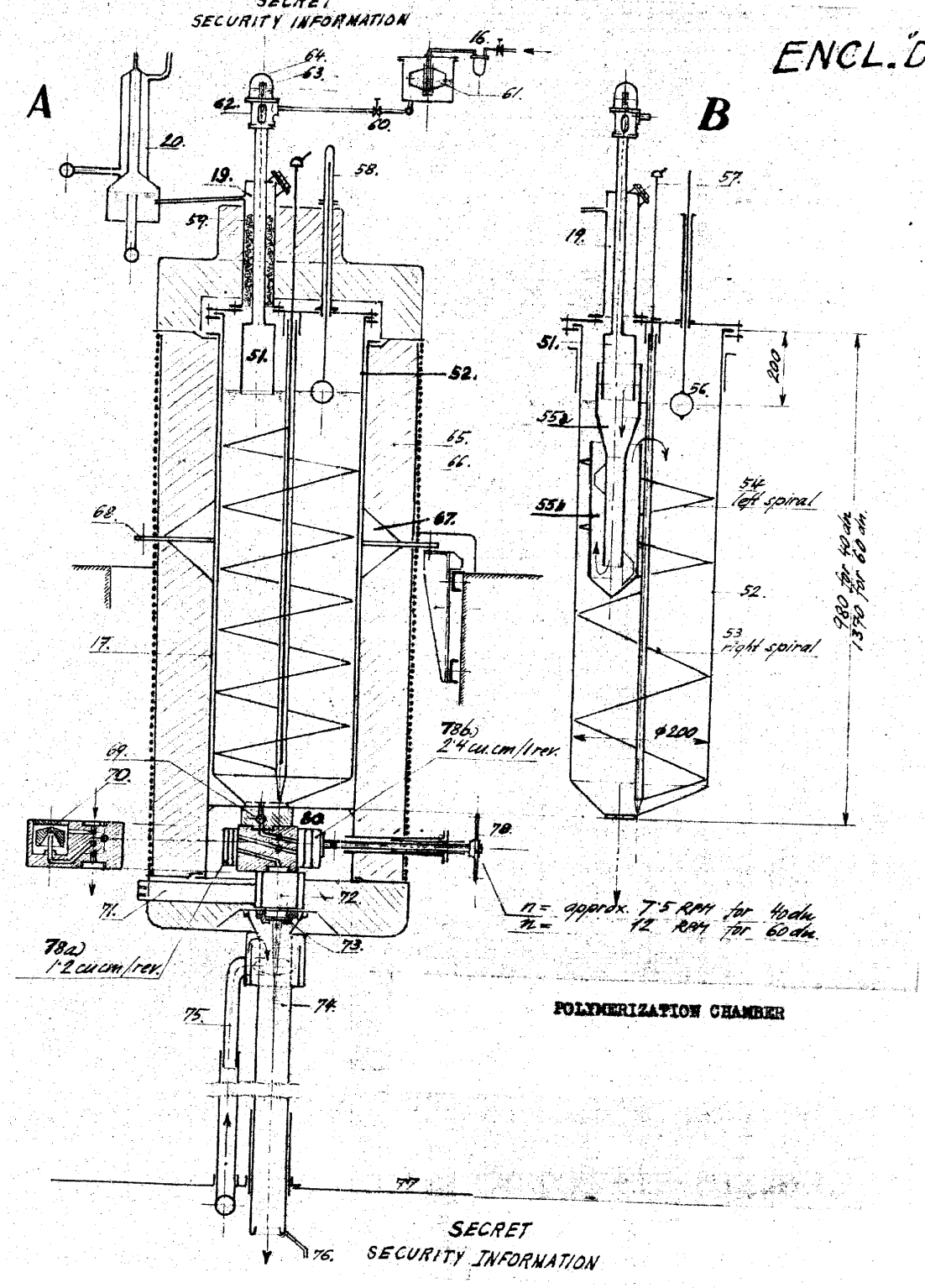
ENCL. "D"



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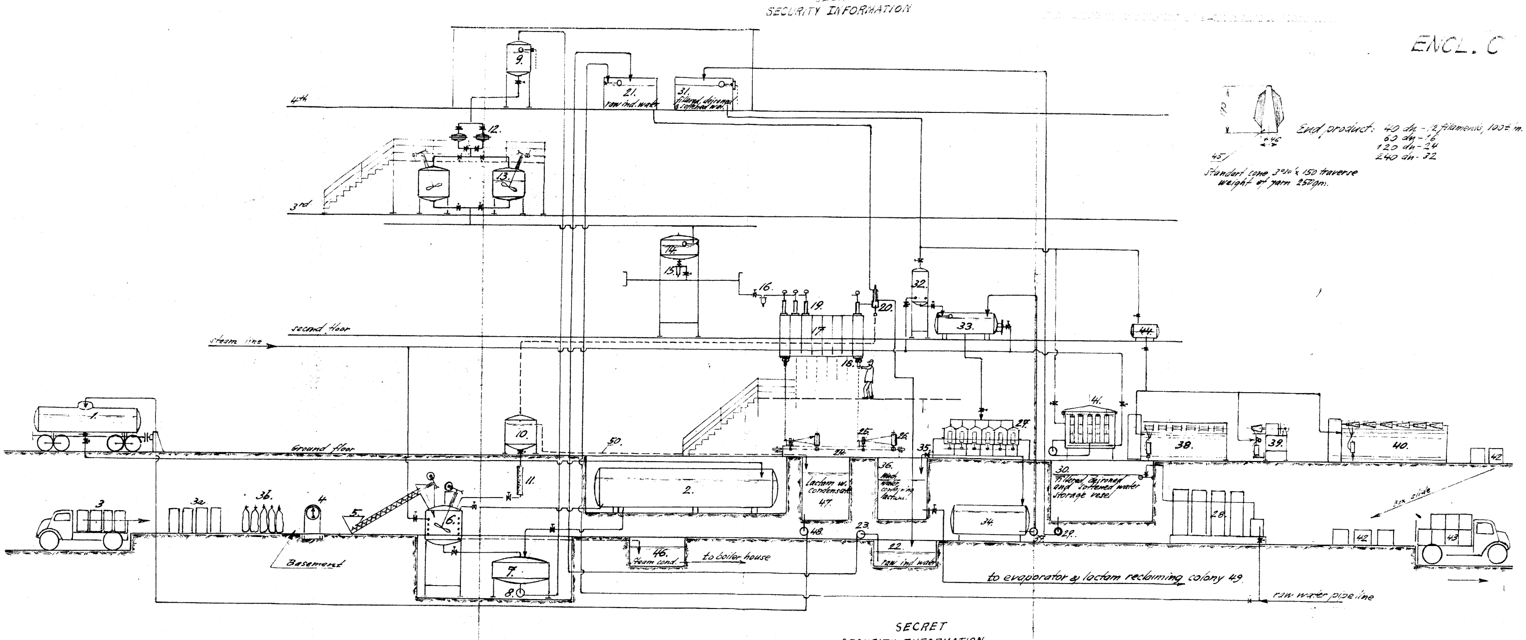
ENCL. C



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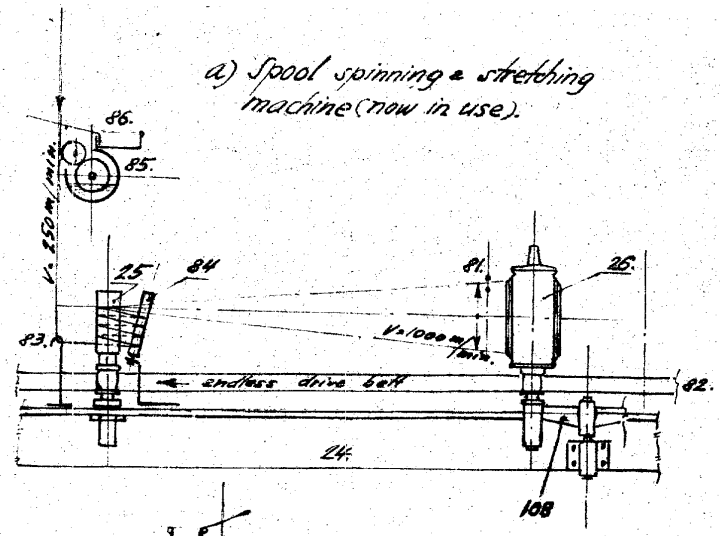
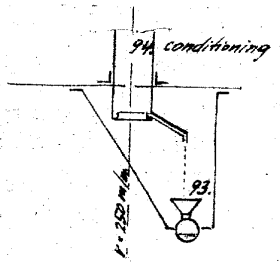
SECURITY INFORMATION

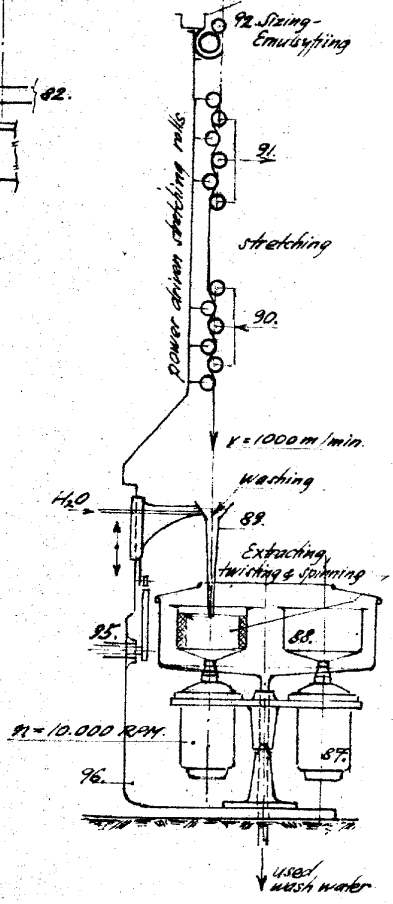
ENCL. "E"

SPINNING AND STRETCHING MACHINERY

a) Spool spinning & stretching machine (now in use).

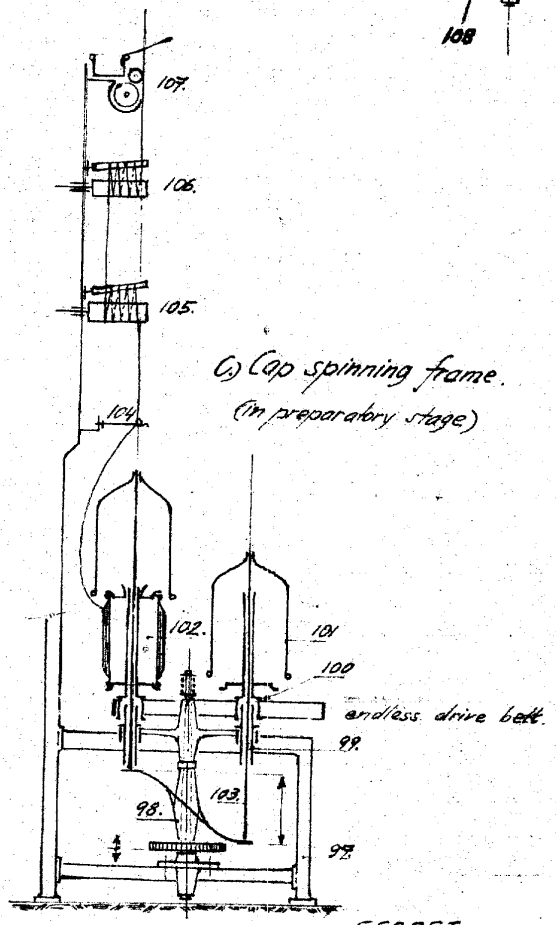






b) Experimental pot spinning machine (being in trial stage)

c) Cap spinning frame. (in preparatory stage)



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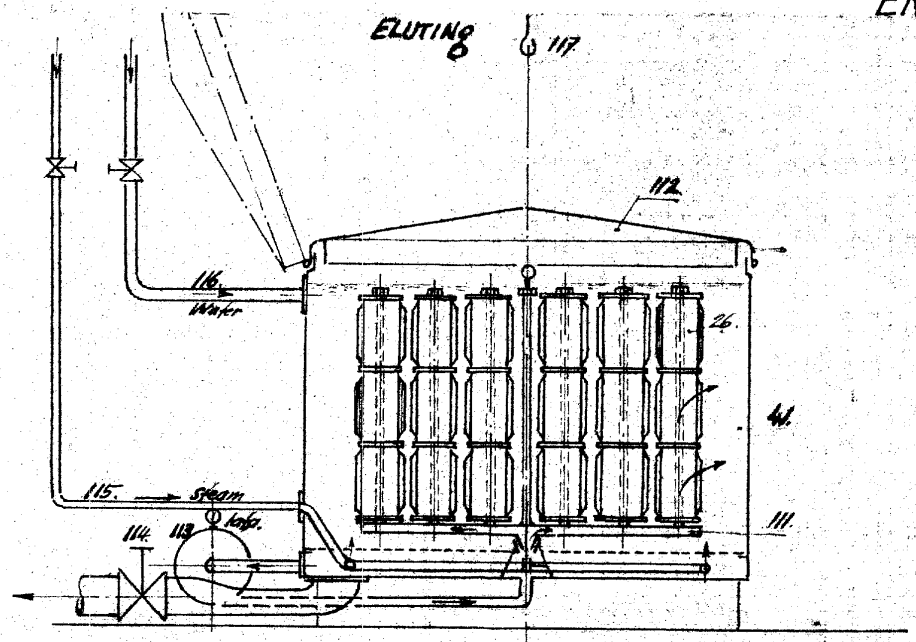
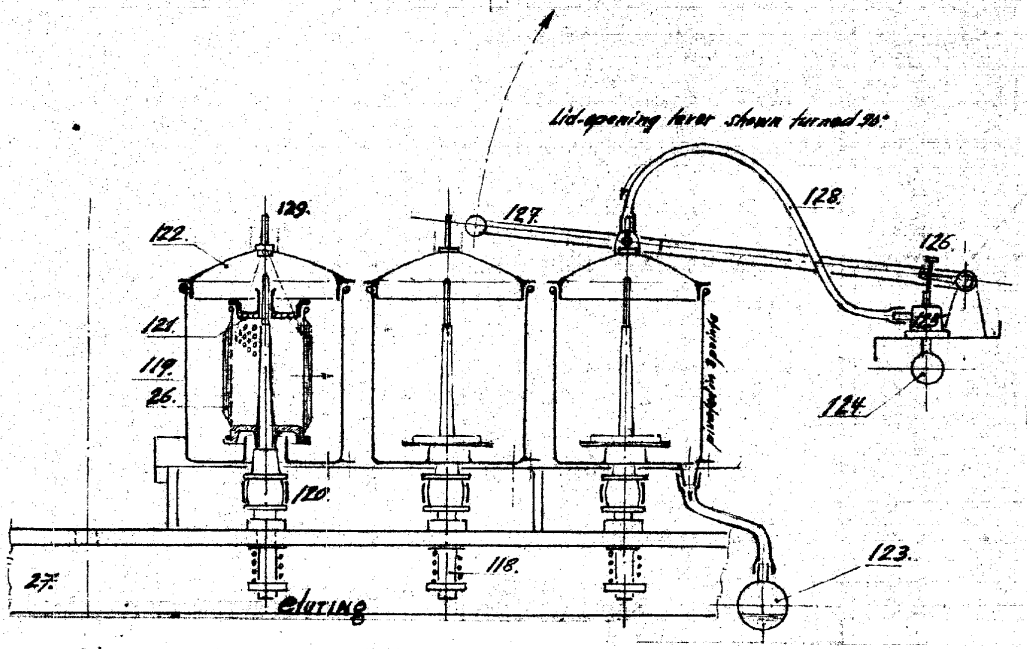
SECURITY INFORMATION

MONOMER [redacted] MACHINES

ENCL. "F"



a) Pressure washing machine



b) Centrifugal [redacted] machine

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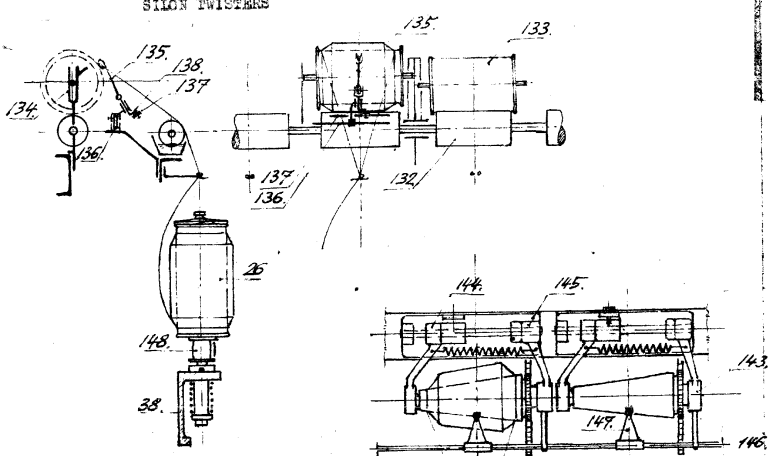
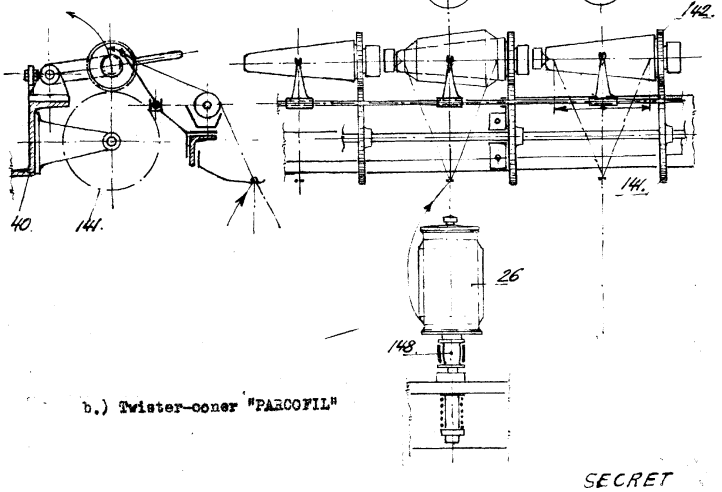
SECURITY INFORMATION

ENCL. "G"

SILON TWISTERS

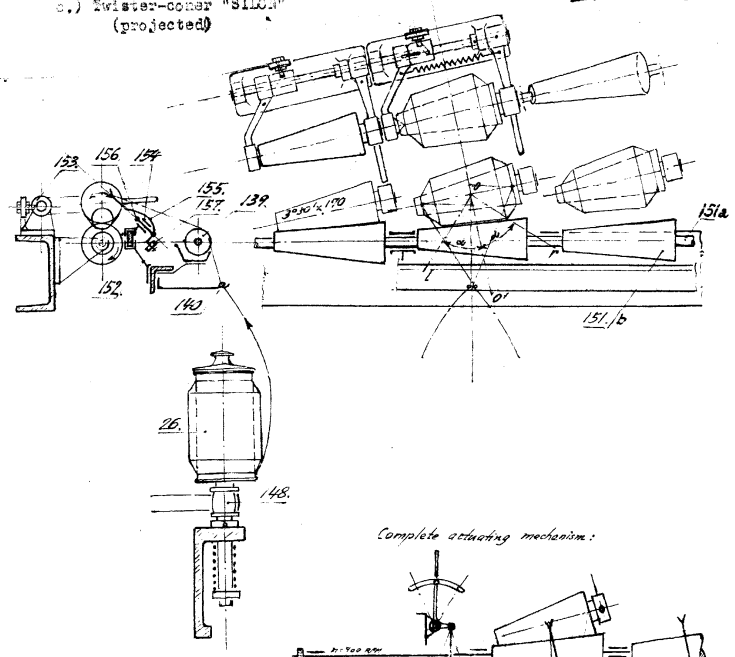


a.) Ordinary twister adapted for pineapple packages.

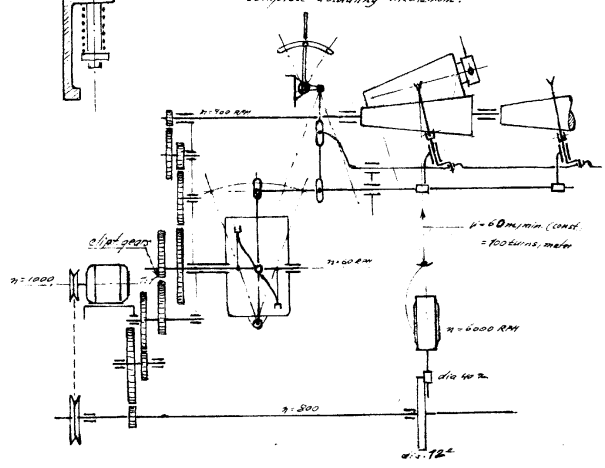


b.) Twister-coner "PARCOFIL"

c.) Twister-coner "SILON" (projected)

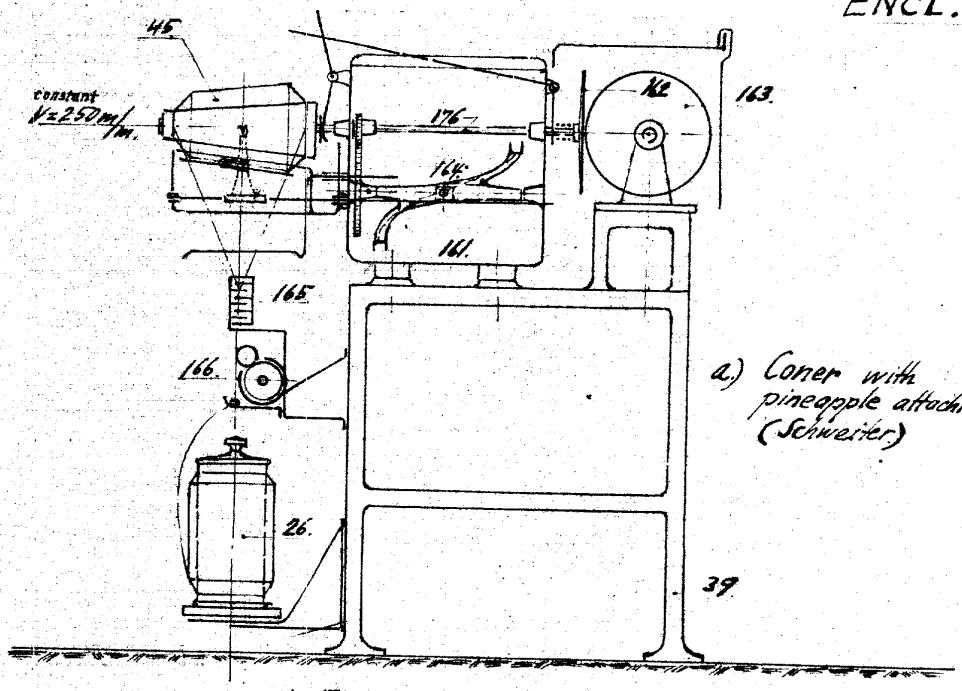


Complete actuating mechanism:

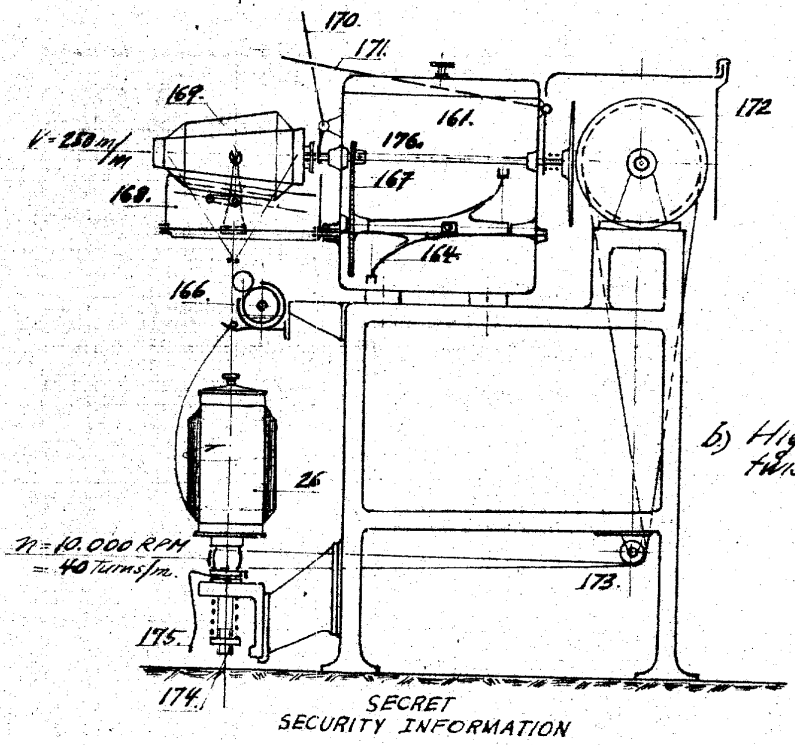


SILON CONER AND HIGH-SPEED TWISTER-CONER

ENCL. "H"

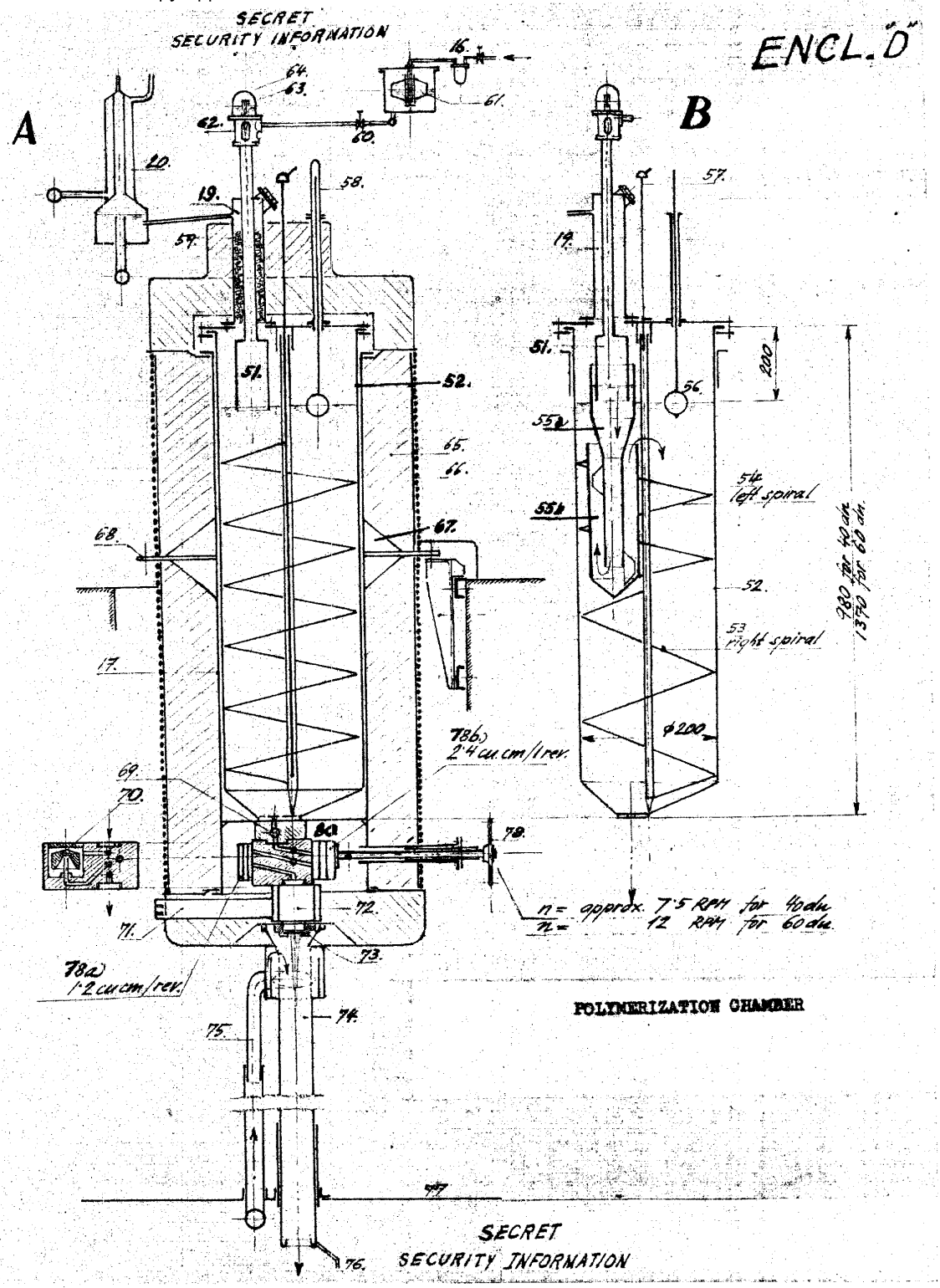


a.) Coner with pineapple attachment (Schweiter)



b.) High-speed twister-coner.

ENCL. "D"



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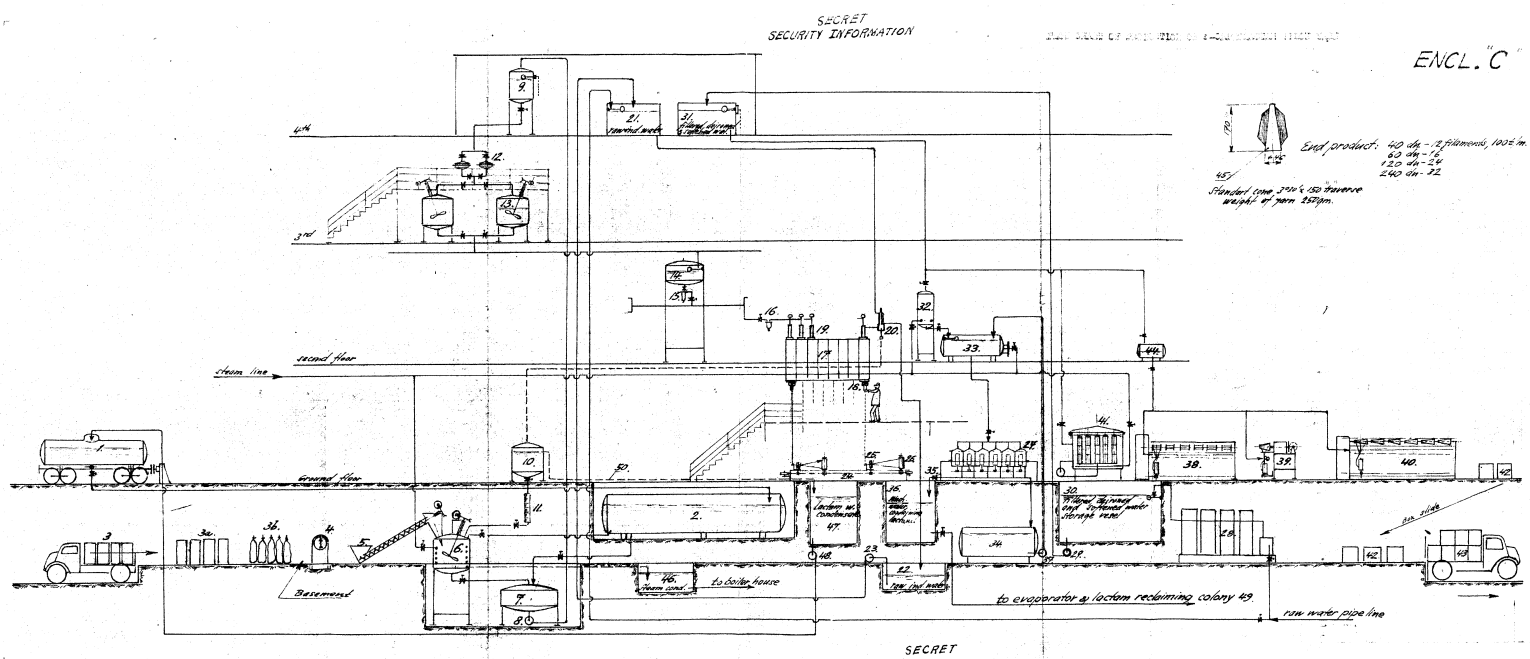
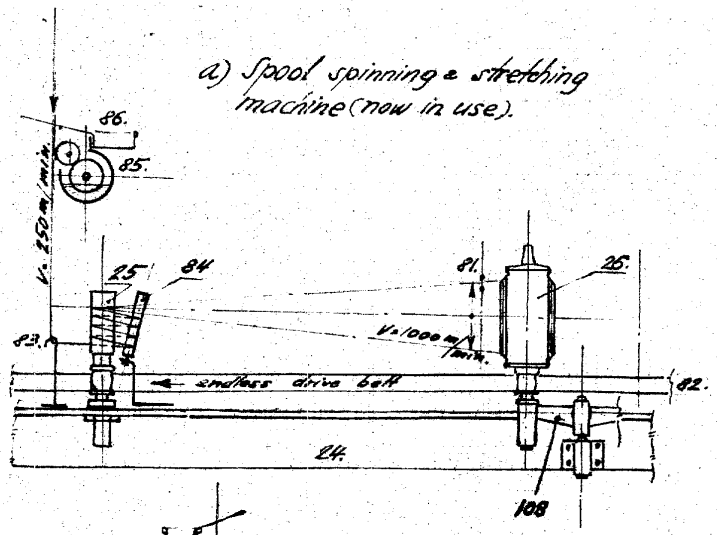
ENCL. "C"



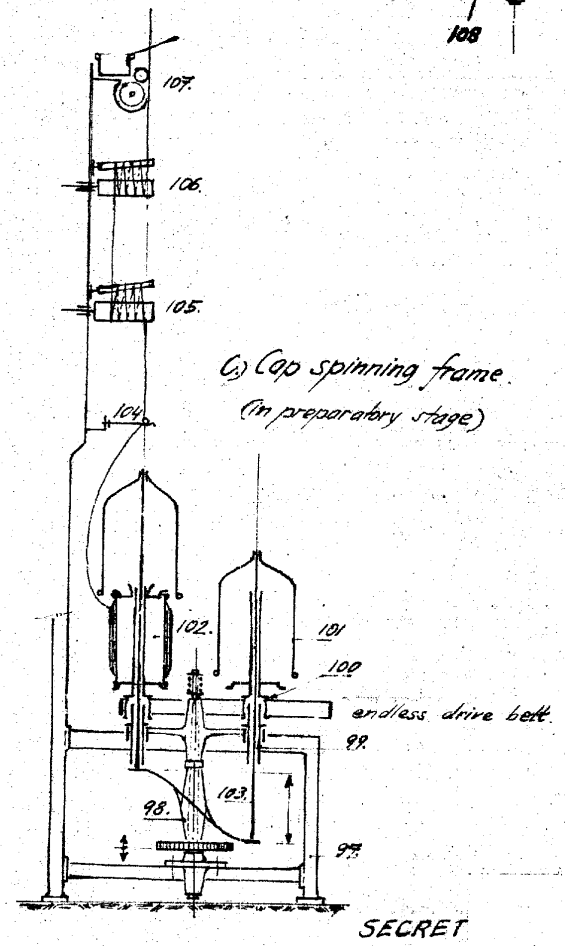
ENCL. "E"

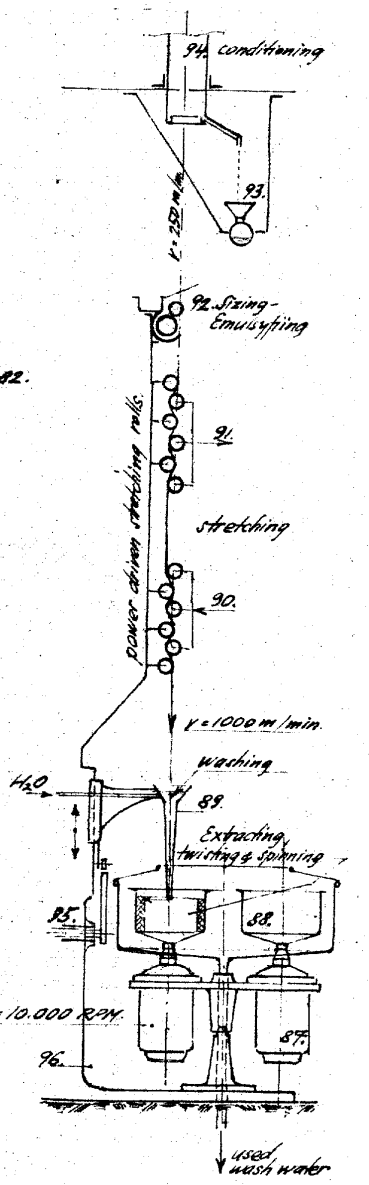
SPINNING AND STRETCHING MACHINERY

a) Spool spinning & stretching machine (now in use).



c) Cap spinning frame (in preparatory stage)



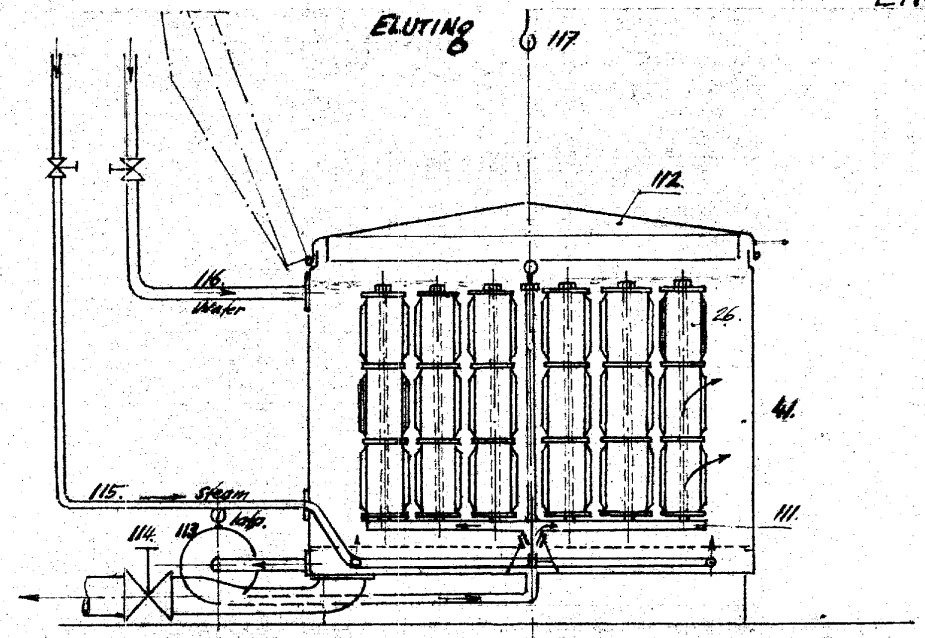


b) Experimental pot spinning machine (being in trial stage)

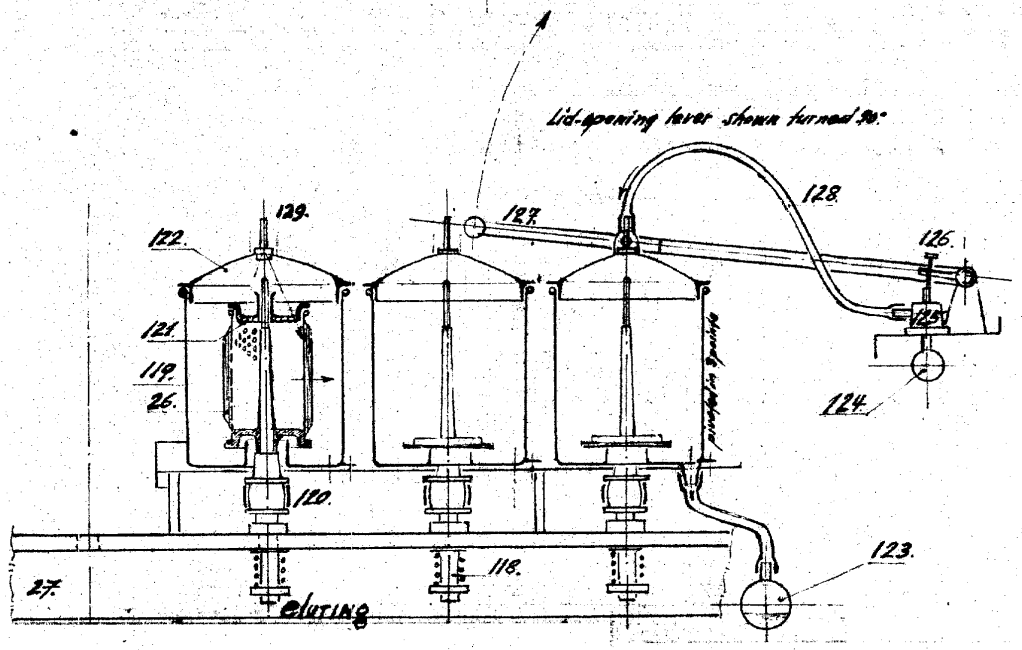
SECURITY INFORMATION

MONOMER [redacted] MACHINES

ENCL. "F"



a) Pressure washing machine



b) Centrifugal [redacted] machine

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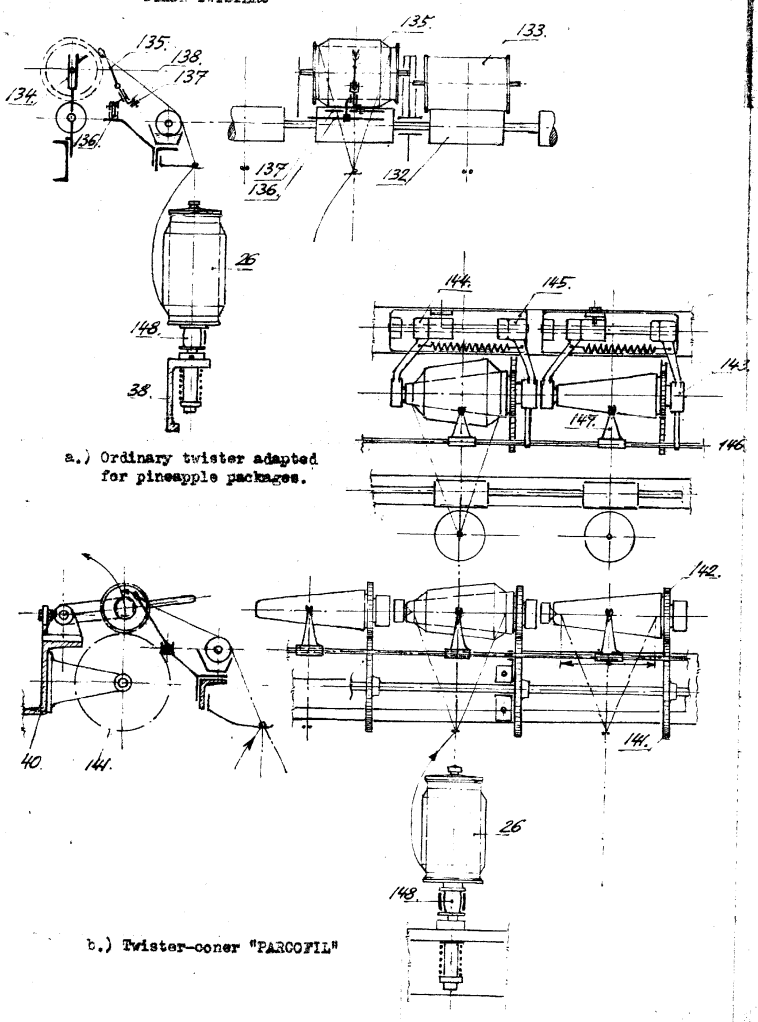
SECURITY INFORMATION

ENCL. "G"

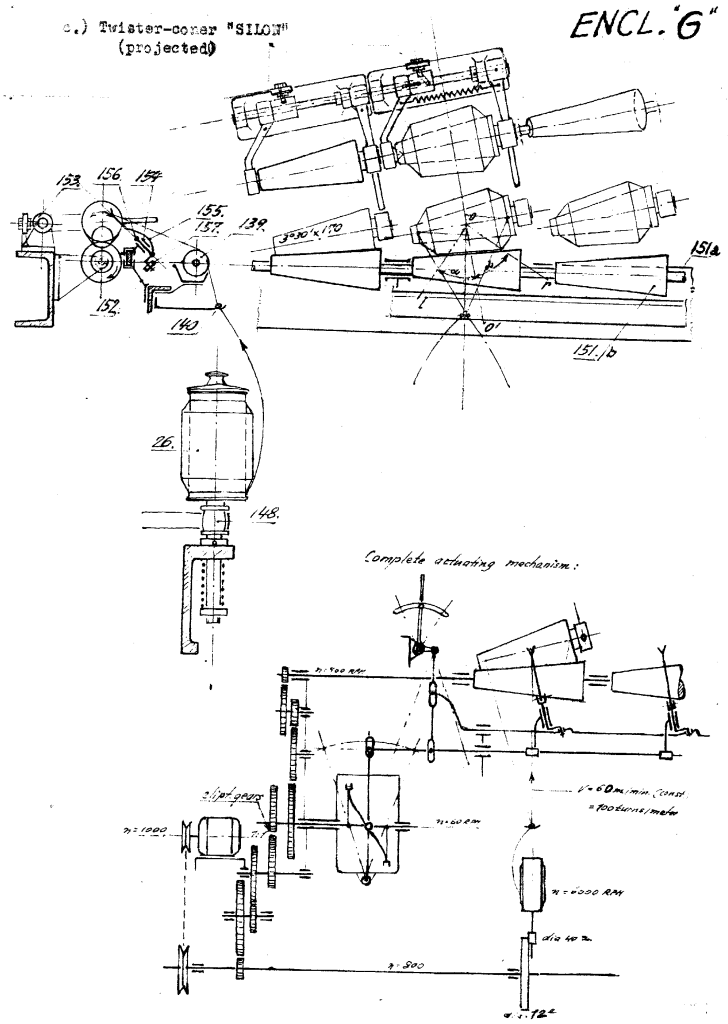
SILON TWISTERS



a.) Ordinary twister adapted for pineapple packages.

b.) Twister-coner "PARCOFIL"

c.) Twister-coner "SILON" (projected)



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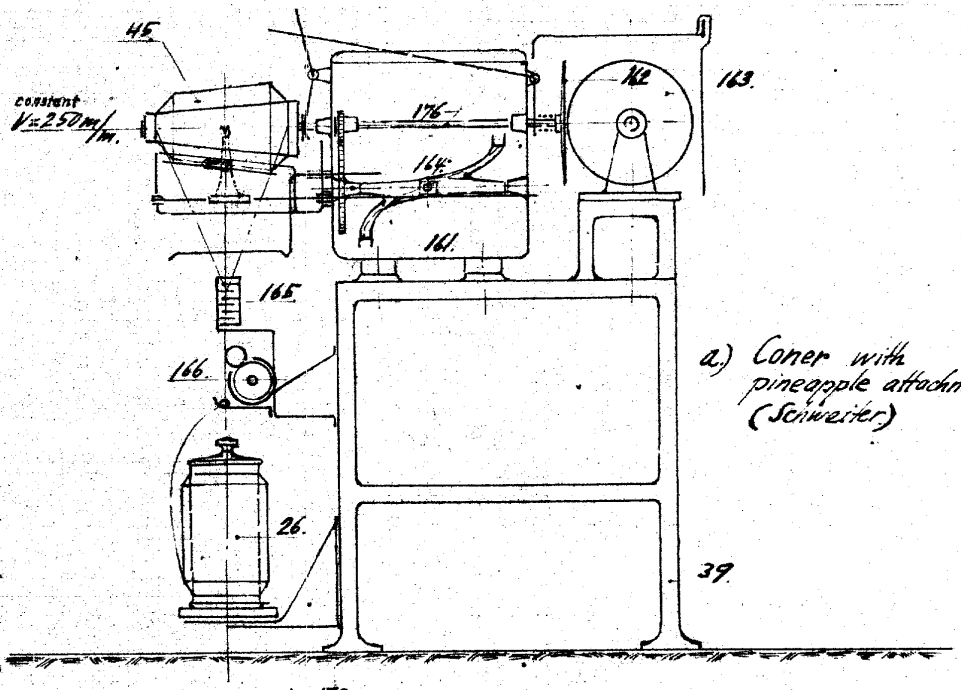
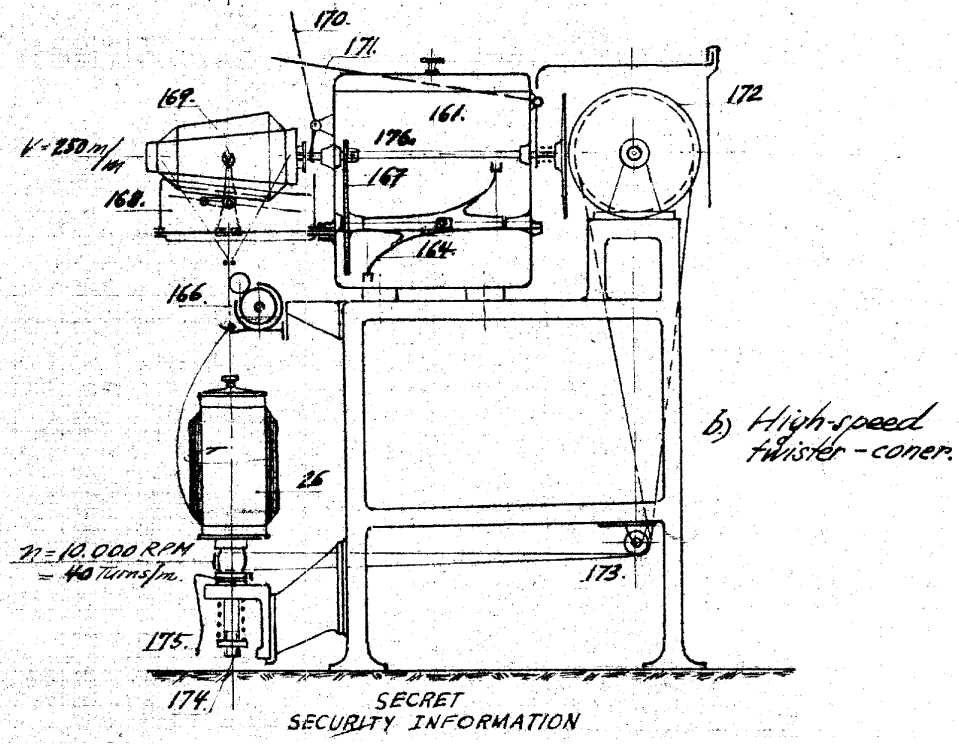
SILON CONER AND HIGH-SPEED TWISTER-CONER

ENCL. "H"



a.) Coner with pineapple attachment (Schweiter)



b) High-speed twister-coner.

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